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No. 1. JANUARY, 1906. Vol. XXVII.

ON THE NEXT GREAT ARCTIC DISCOVERY.*

THE BEAUFORT SEA.

By Sir CLEMENTS R. MARKHAM, K.C.B., F.R.S.

I THINK that the time has come for taking stock of our Arctic knowledge, and for deciding what work of importance remains to be done. For we are now able to take an intelligent and scientific view of the Arctic Regions, and to see exactly what remains to be discovered, and how the unknown parts would fit in and make the whole problem complete. Until lately we had before us many unconnected stories of discoveries in one direction or another. Now, thanks to the researches of scientific thinkers and explorers, each discovery is falling naturally into its place. We can see the whole grand edifice, and note what stones are wanting to make it perfect.

The discovery by Dr. Nansen of a polar ocean with a depth of 2000 fathoms, drew the veil from the Arctic mystery and made all things clear. That this ocean extends to and beyond the pole is shown by convincing evidence. The great harvest of ice drifting southwards between the track of the *Fram* and the east coast of Greenland must, of necessity, come from an area to the north of the *Fram's* track. Again, along the course of the *Fram*, at depths of 480 to 500 fathoms, colder water was found above that affected by subterranean heat, but beneath the overlying stratum of warmer water. It must have cooled down in the unknown Arctic basin, in contact with the cold surface water, in an area occupying most of the still unknown polar region. So that the deep polar ocean probably covers the greater part of the unknown area, and rising from such depths there can hardly be any land.

This polar basin is almost surrounded by continental lands, whence

* Research Department, November 13, 1905.

shelves, at no great depths, extend to the edge of the deep ocean where there is a more or less rapid descent. North of the New Siberia islands this descent is from 54 to 1050 fathoms in 40 miles. North of Spitsbergen it is from 90 to 630 fathoms in 30 miles. The width of the continental shelves is greater when extending from low lands, and less where the land is more steep and abrupt. Facing the low plains of Siberia the width of the shelf was found by Nansen to be 30 miles, and at the outer edge the depth was only 54 fathoms. The width of the shelf is usually only 40 to 100 miles in extent, beyond the outer line of land.

All undiscovered Arctic land probably rises from the continental shelves, just as all discovered Arctic land does. There can scarcely be any land rising out of an ocean with a depth of 2000 fathoms.

The question of the continental shelves and of the bathymetrical features of the North Polar sea has been considered in great detail by Dr. Nansen in his last volume; and his conclusions have been carefully summarized by Prof. Spencer in the April number of the *American Geologist* (vol. 35). My main object now is to bring their conclusions to the notice of English geographers.

We learn that all along the coast of Siberia, from Alaska to Franz Josef Land, the width of the continental shelf is nearly uniform, with a general depth of less than 100 fathoms. The soundings have revealed deep submarine valleys opening towards the polar sea. This, however, is not the case on the shelf along the Siberian coast. Nansen accounts for the absence of these valleys by the coast-wise distribution of sediment brought down by the great rivers, which has filled them up.

In the Kara and Barents seas there are many of these submarine ravines or valleys, and the whole bottom appears to have been elevated above the sea-level, probably at some not very remote geological period.

Spitsbergen and Franz Josef are on the outer edge of the shelf, there being a width of only 30 miles to the north before the deep ocean is reached. Here the depths are irregular, because the platform is cut by valleys running north from the Barents sea.

We know much less of the width and depth of the shelf to the north of Greenland, Ellesmere island, and the Parry archipelago. We have the sounding taken by Sir Albert Markham at his furthest north, 30 miles from the land, in 70 fathoms. From the characteristic of narrow shelves in front of high lands, from the absence of land for 100 miles, and from the depth, Prof. Spencer infers that the edge of the continental shelf was here nearly reached by Markham, and actually crossed by Peary.

Nansen calls attention to the soundings in the channels of the Parry archipelago indicating that it was a region of typical fjords opening into the polar basin, which he considers is not very distant.

There are depths of 91, 220, and 270 fathoms. In Lancaster sound there is a fjord deepening from 130 to 330 fathoms. There is another deep fjord, trending to the polar basin, in Cardigan strait, with a depth of 400 fathoms.

Prof. Spencer looks upon the Parry archipelago as a high plateau region cut by valleys, and subsequently submerged in part. Judging from the depths in the submarine fjords, the shelf to the north would be comparatively narrow, not more than 50 miles. So that no land can be expected north of Prince Patrick island, or of the islands discovered by Sverdrup.

From the Parry islands towards the New Siberia islands there is an area probably occupied by a continental shelf; and this area is now the least-known part of the Arctic Regions, and the one which contains the most interesting geographical problems. Great part of it is occupied by a sea bounded on the south by the American continent, and on the east by the west coast of Banks and Prince Patrick islands. It has received the name of the Beaufort sea.*

Ever since I was serving in the Arctic Regions, more than fifty years ago, I have taken a special interest in the Parry archipelago,† and the region between it and Siberia. In my 'History of Griffith and Cornwallis Islands' I gave an account of the Silurian fossils which are so abundant, and also described the Eskimo relics which I and my shipmates met with while sledge-travelling. All along the southern shores of the Parry islands, facing Barrow strait, there are the remains of Eskimo encampments. I examined many myself, and collected relics. There were winter *iglus*, the stones showing summer tent places, fox-traps, scrapers, parts of the bone runners of sledges, and, what I thought most interesting of all, a long willow switch covered with lichens. Indeed, all the relics were more or less covered with lichens, showing their great antiquity. When M'Clintock, in 1851, found the bones of ptarmigan eaten by Parry in 1820, they were as clean as when first picked. In intense cold lichen is of extremely slow growth.

Two facts appeared to be clear to us—that the people who had thus left so many vestiges of their presence were moving eastward; and that the emigration took place at some very distant period. We naturally looked to the existence of a line of islands between our position and Siberia, along which they might have come.

---

* From American coast to north end of Prince Patrick island, 500 miles; south-west point of Prince Patrick island to Wrangel island, 950 miles.

† The Parry archipelago should include all the islands north of the American continent, except Baffin Land, North Devon, and Ellesmere island, which form a separate group opposite to Greenland. All the Parry islands were discovered by Sir Edward Parry himself, except King William island by Ross, and Wollaston island. The geographical positions of the islands discovered by Sverdrup place them in the Parry archipelago.

The late Admiral Sherard Osborn wrote an excellent article on the subject in our Arctic newspaper, the *Aurora Borealis*, which would have been worthy of a place in his collected works. Quoting from Baron Wrangell's book, he pointed out that there was actually a Siberian tradition respecting this movement of tribes. The Onkilon and Omoki, whose hearths were once as numerous as the stars of an Arctic night, had gone away over the ice, and had never returned. Their departure appears to have been due to pressure from more powerful tribes to the south. It was possible that the people whose traces we found might have crossed by Bering strait, and marched along the American coast and northward by the west side of Banks island. But it seemed unlikely that they would go from a more hospitable to a most inhospitable region. We preferred to think that they worked their way eastward, along unknown islands on the north side of what was afterwards called the Beaufort sea.

The journeys of M'Clintock and Mecham in 1853 along the western coast of Prince Patrick island, and the voyage of McClure along the western side of Banks island, gave us fresh information respecting the Beaufort sea. Prince Patrick island was reported to have a very shallow coast, with heavy grounded ice in the offing. Possibly this is an indication that the continental shelf extends so far north under a shallow sea, but the pressure on the coast seems to make it improbable that there is any more land to the westward in that latitude (76° to 77° 30′). Sherard Osborn edited Sir Robert McClure's book, and described the ice off Banks island to be of great age and thickness, with a surface of rounded hill and dale. Sir Richard Collinson made an advance of a day or two from the American continent, but found the ice so heavy that he was unable to proceed, and gave up the attempt.

This information respecting the Beaufort sea rather confirmed our belief in islands to the north of it to the south of 76°. The extraordinarily heavy ice off Banks island led us to think that it was the accumulation of ages, kept there by islands locking it to the north. In that case the whole of the Beaufort sea would be shallow and within the continental shelf, which would extend from 30 to 40 miles to the north of the supposed islands.

But a contemplation of the long line of heavy ice-pressure round the whole western side of the Arctic Regions, revealed to us by the expedition of 1875, raised a doubt in my mind whether the ice in the Beaufort sea was not part of the deep polar ocean itself, extending, in this part, to the edge of the shelf, 40 or 50 miles wide, in front of the American continent. In that case no islands could exist in the supposed positions.

Prof. Spencer points out the evidence derived from soundings, which shows that there are at least three submarine valleys or fjords intersecting the Beaufort sea in the direction of the polar ocean—one from the south, one from the south-east, and one from the east. It

must be remembered, however, that the number of soundings is very small. Many more are needed to derive any positive arguments from them. The Mackenzie river, after passing through its own delta, extends to a submarine valley 190 fathoms deep, cutting into the Beaufort shelf. In the channel between Banks island and the American continent there is a submarine valley with a depth of over 300 fathoms, also cutting into the floor of the Beaufort sea. In McClure strait between Banks and Melville islands there is a third fjord, with a depth of 280 fathoms as far as 200 miles within the line of the islands. Considerable depths in the submarine valleys point to a narrow continental shelf. Hence these three submarine fjords, entering the Beaufort sea from three different directions and with such depths, are rather indications of the proximity of the edge of the shelf to the American continent and to Banks island, which will be against a probability of land to the north.

On the other hand, the Beaufort sea may be comparatively shallow and ice-covered, the bottom forming a broad valley on the continental shelf, with deep ravines cutting its surface and leading to the polar basin between as yet undiscovered islands.

Dr. Harris, in a paper in the American *National Geographic Magazine* (June, 1904, vol. 15, No. 6), supports the view that there is undiscovered land to the north on the ground that the currents from Bering strait turn to the east and west. It seems to be a mistake to suppose that there are currents of any volume flowing east and west from Bering strait. The strait is too shallow to admit of any such entrance of volumes of water forming currents. The drift of the *Jeannette* was not caused by a current coming from Bering strait. Dr. Harris infers that there must be land north of the Beaufort sea which checks the northward flow of this supposed current from Bering strait. He also adopts Sherard Osborn's view that the ice, from being very old, appears to have no broad outlet, but only openings through narrow channels. Both Prof. Spencer and Dr. Harris concur in what I once said—that there is land between Prince Patrick island and Siberia. Prof. Spencer would limit its occurrence to a line directly connecting the two positions. Dr. Harris believes in a continental mass of land extending to the pole, but, as I think, on mistaken data. Any land in this part of the Arctic Regions will probably be found to consist of islands skirting the edge of the continental shelf. The drift of the *Jeannette* in 30 or 40 fathoms was well within the shelf, and there might have been land to the north, and nearer the edge, which would not have been visible to those on board her, although land was reported to the north more than once.

Mr. Mikkelsen has brought to my notice a point which I consider to be of considerable importance. He has pointed out to me that the drift of the *Jeannette* was at first half a mile a day, that it increased to

2·2 miles, and that latterly it was 3·2 miles a day. This makes it quite certain that the current does not come from Bering strait, for a current is not accelerated at a distance from its origin without some new force unconnected with that origin. The question arises, Whence comes this acceleration? and one naturally turns for an explanation to the Siberian rivers. But a current from that coast would have drifted the *Jeannette* to the north. In point of fact, her drift was longitudinal with little northing, until near the point where she was lost; when the drift had turned north. These facts certainly point to the existence of land to the north of the *Jeannette's* track, ending where that track turned north. At this point the *Jeannette* was 200 miles from the *Fram's* track in the same latitude, where the current only took the *Fram* half a mile a day, increasing further on to a mile. So that the phenomenon of an accelerated current experienced by the *Jeannette* had ceased before the current reached the *Fram's* position, while the northerly direction continued.

There is another consideration which might be held to indicate the existence of land in the unknown area, derived from the narrow character of the channel between Iceland and Greenland. If the whole unknown area is an ocean, the outlet for such a vast quantity of ice is too narrow. But a large part of it appears to be forced upon the northern shores of Greenland and the Parry archipelago.

The question of driftwood should have its due place in the argument. It was found by Parry at Melville island. Several pieces of decayed wood were found on the south coast of Prince Patrick island; and in a ravine Lieut. Mecham observed a large spar protruding from the bank for 10 feet, and 4 feet in circumference. Several parts of similar trees were just showing above the ground, one of them 30 feet long. On Eglinton island there was fossil wood.

On Ballast beach, the north-west coast of Banks island, there were great accumulations of fossil trees lying from the seashore to a considerable height inland. Layers of trees (*Abies alba*) were visible, obtruding from the rock. In one ravine there was a mass of wood for a thickness of 40 feet from the surface.

In Sir George Nares's expedition a considerable quantity of driftwood was met with on the beaches of each bay open towards the north-west. The wood was only found near the margin of the sea and in the lake-beds. If left exposed it rots away, but when buried under the frozen muddy soil it remains undecayed for ages. On the eastern shore of Hilgard bay there were great quantities of drifted wood, in pieces varying from a foot to 15 feet in length. Some were 40 feet above the sea-level. Colonel Feilden had thirteen samples examined by Dr. McNab, who reported that eleven of them were coniferous, and two dicotyledons (*Populus*). He thought they were North American.

Sir Roderick Murchison was of opinion that, at the period of the

deposit of the Banks island wood, large portions of the Parry archipelago were submerged, trees and cones were drifted from the nearest land on which they grew, and eventually deposited on submarine rocks. Then there was a gradual elevation of the land, carrying with it the drifted timber.

It is much to be desired that we should be certainly informed whether the driftwood is of North American or Siberian origin, or whether it may be derived from both sources. Its existence in such immense quantities seems to point to the absence of any continental land which would have prevented its reaching the distant shores of the Arctic archipelago, though there may be islands near the lines of drift. At the same time the contrary current which caused the drift of the *Jeannette* seems to preclude the possibility of the driftwood having come from Siberia.

Let us now turn for a moment to a general view of the whole circumpolar region, to see what position is held by the part which we have been specially considering.

The islands on the continental shelf and the bordering lands must be looked upon as comprising the whole of the terrestrial Arctic Regions, and geographers should look upon problems connected with those regions from that point of view.

Dr. Nansen has described the Arctic continental shelf in much detail. Prof. Spencer has turned his attention mainly to the valleys and ravines by which the shelf is intersected, as revealed to us by soundings.

It is a subject full of interest in many branches of scientific inquiry. On the Siberian side the shelf is described to us from careful personal observation by Nansen. We see the group of New Siberia islands and Bennett island rising from it, with their mammoth ivory and cliffs of fossil wood. We then contemplate the land masses of Novaya Zemlya, Franz Josef, and Spitsbergen, rising from the Kara and Barents seas, with the marvellous tale they tell of the former condition of the region in recent geological times. Next, on the further side of the great southerly ice-stream, is the continental mass of Greenland with its glaciation, only surpassed in grandeur and extent by the Antarctic ice-field. Then the somewhat analogous land masses of Baffin and Ellesmere islands, with the separating straits and channels. Finally, the intricate Parry archipelago to the north of the American continent. These lands, bordering on, or rising from the continental shelf, form the Arctic Regions as we know them. But between the Parry archipelago and the Siberian shelf there is, as has been shown, a vast area in and to the north and north-west of the Beaufort sea of which we know nothing. I have referred to the reasons that have been adduced for thinking that it may contain land, and land of great interest, and also to the reasons against that hypothesis. Knowledge of the Arctic

Regions will remain very incomplete until this area has been discovered and explored. It is one out of several geographical undertakings that call for attention, and one of the most important.

I should like to see the *Discovery* rented from the Hudson Bay Company, and stationed in a secure harbour near the mouth of the Mackenzie for two winters, or still better, at Melville island. She should be manned by British seamen, not fewer than enough to form three extended sledge-parties, and three depôt parties. The object should be to explore this unknown section of the continental shelf over the Beaufort sea as far as the edge of the polar ocean. Each sledge must carry sounding line sufficient for any depths likely to be found over the shelf, but not, of course, for deep-sea sounding. The nature of the ice surface, as described by McClure, appears to be difficult for sledge-travelling, but not insurmountable. The ice is probably, to a large extent, stationary. If the journeys of M'Clintock, Mecham, or Scott are laid down from the proposed winter quarters over the Beaufort sea, it will be seen that they will reach the probable position of the edge of the polar ocean, and will thus lead to the discovery of any possible land.

This geographical achievement is the proper work of the Government. If our rulers continue to neglect a duty so deeply felt and so well performed in the days of old, it should be advocated by a great society. Meanwhile geographical enthusiasm cannot be repressed. It begins to be seen that this is the chief Arctic work that remains to be done, and young aspirants are coming forward. Yet the risks are great with small and insufficient means.

Mr. A. H. Harrison is the first in the field. He has gained the Society's Diploma. He has carefully studied all the existing literature on the subject. He has considered his plans with reference to his means. He has not asked for any aid from the Society. He is entering upon a most hazardous and difficult enterprise in the interests of geographical science, and he deserves all the encouragement and countenance we can give him. Mr. Harrison will make an attempt to reach Prince Patrick island, and to traverse part of the Beaufort sea, in the hope of discovering land.

We have another aspirant in the person of an enthusiastic young Dane, Mr. Einar Mikkelsen, who served with Amdrup on the east coast of Greenland, and in the Baldwin-Ziegler expedition. He has carefully studied all the literature on the subject, and appears to be in a fair way to obtain sufficient funds. He intends to descend the Mackenzie river and meet a whaler by previous arrangement. He will winter at the south-west point of Banks island, having previously established a depôt at Prince Alfred cape. In the early spring he will work westward for 400 miles from Prince Alfred cape, and then return southward to the mouth of the Mackenzie, with the object of discovering land if

it exists. His party is to consist of three, himself included, and he calculates on aid from the Eskimo If he discovers land, he intends to return at once without attempting to explore it, in order to report and organize a more efficient expedition.

The expeditions of Harrison and Mikkelsen involve great hardships and difficulties, as well as serious risks, owing to the very limited scale on which they are necessarily planned, and to insufficient funds. But, like the writings of Prof. Spencer, they point correctly and unerringly to the next great exploit that is needed in the interests of polar geography. I have never encouraged enterprises unless the advantages to be gained are in proportion to the risks to be encountered. I believe that in this case the results to be sought are of the highest geographical importance.

I am far from committing myself to a decided opinion on any of the points that have been discussed. During the summer a friend of mine, Sir Harry Vernon, sent me a volume, by General Sir Rufane Donkin, on the course of the Niger, taking it through Lake Chad to the greater Syrtis in the Mediterranean. It is a very learned treatise, and was published in 1829. The true course and mouth of the Niger were discovered in 1830. Geographical facts upset all the general's learned arguments derived from Herodotus, Ptolemy, Edrisi, and Abulfeda, almost before his ink was dry. It must have been mortifying. It is certainly a warning never to be over-positive in geographical speculations. I have endeavoured to avoid this pitfall, and to confine myself to a review of what we know, and to a suggestion of the most probable solutions from the actual data in our possession. But our knowledge is incomplete, and the more incomplete it is on certain points the more urgent it is that the truth should be sought for and discovered.

There is other valuable work in the Arctic Regions—such as the complete examination of the east coast of Greenland, contemplated by Mr. Mylius Erichsen; and the exploration of Baffin island and its great inland lakes, to be undertaken by the Dominion Government. But the only great discovery that remains to be achieved lies over the continental shelf of the Beaufort sea.

APPENDIX.

Mr. Einar Mikkelsen's Plan.

In order to ascertain whether there is land to the north of Alaska or not, I have, with two or possibly three companions, decided to make an attempt to explore the Beaufort sea. My partner and companion, Mr. E. Leffingwell, has considerable experience in Arctic work, and Mr. E. Ditlevsen has travelled in Greenland. The possible third companion has also experience in that kind of work. Our plans for working are as follows. Mr. Leffingwell, geologist, Mr. Ditlevsen, naturalist and artist, and probably a third man, will leave Athabasca landing in the latter part of May (1906) *en route* for the Mackenzie river, to descend to the polar ocean. Thanks to the steamers which run on the Mackenzie river, and to the Hudson Bay

Co.'s kindness, the ocean will be reached in the latter part of July. The party will there do what scientific work there can be done in the space of time—about a month between their arrival and the arrival of a St. Francisco whaler, which will bring me and supplies around. I myself will go with the whaler through Bering strait, for the double purpose of making hydrographical investigations in the Bering sea, Bering strait, and the polar ocean to the west and east of the strait, in order to ascertain whether any water from the Pacific enters there or not—a question which it seems very desirable to get settled—and in order to purchase a pony or two on the Siberian coast. I shall endeavour, also, to get my pack of dogs at different native settlements, as that would ensure me getting a better pack than in buying them all at one place.

About August 8 the whalers leave for the Alaskan coast, and usually about the latter part of August they reach the mouth of the Mackenzie river. Here my party will be picked up, and we proceed eastward to Cape Bathurst, where I shall endeavour to get a couple of suitable Eskimo.

If the sea-going whaler cannot be persuaded to go across to Banks Land, our provisions and gear will be shipped on board a small schooner, which cruises in the waters between Cape Bathurst and Banks Land. In this schooner we shall endeavour to reach—which the frequent visits of that whaler in Banks Land ensures me is possible—Cape Nelson, or, better still, Cape Kellet. At our landing-place all our gear will be unshipped, and the vessel will at once depart southward.

A boat brought up by the whaler, and capable of carrying three to four tons of provisions, will be loaded, and a party will leave with it in order to place a depôt on Cape Prince Alfred, or on the islands off the coast. If time permit, the party will stay there in order to get and cache some game, which will enable us to stay a short time at the depôt the following spring without wasting any of the sledge provisions. The party will then depart southward. The two men left at the camp will meanwhile have worked at getting the camp into shape, so that we can at once begin taking observations. The geologist and naturalist will make as extensive a collection at this place as possible. As extensive meteorological and magnetical observations as possible will be kept up during the winter.

Early in the following spring, the middle of February, the entire party will start northward to the depôt. Arrived at this place, the sledge party—Mr. Leffingwell, myself, and a third man (probably Mr. Ditlevsen)—will start out on the ice, helped over the broken up land-ice by the fourth man and the Eskimo. As soon as the party to proceed can help itself, the assisting party will depart southwards, *en route* for Cape Bathurst, Fort McPherson, to reach Camden bay, there to await the further-going party. The sledge-party will start with thirty dogs and one pony, and will be able to carry provisions for about 132 days. Means for soundings too will be taken probably in the form of strong silk thread of a certain length (150 yards). There will, too, be carried some small weights from 1 to 2 ozs. By these means we shall be able to find the bottom to about 100 fathoms. If deeper soundings would be desirable, the empty provision-tins, crammed together, will afford sufficient weight. This means of sounding is, of course, extremely insufficient, but it enables us to see, anyhow, whether the edge of the continental shelf is crossed or not. We shall endeavour to follow a west-north-west direction to about 76° 30′ N. lat. and 147° W. long. This distance is about 310 miles, and leaves about 380 miles to the nearest coast on the Alaska (Camden bay). If the ice encountered is good, we shall, instead of striking the Alaskan coast, endeavour to reach Wrangel Land, which distance is only about 200 miles longer. The results obtained, if the latter plan can be carried out, is much more satisfactory, but that must depend on the condition of the ice.

If land is found, we shall only carry out a rough survey, and devote our time to ascertain how big in extent it is, in order to judge the importance of the discovery, so as, on our return to civilization, to organize a more efficient expedition. Even if land is not encountered, the results of the expedition will by no means be negative, as we shall be able to ascertain approximately the extent of the continental shelf, and so, if the theory still is held that land exists to the north of the Alaskan coast, to have restricted the area of search.

Besides the sledge journey, we shall achieve results in the following branches: *Geology* and *zoology* at Mackenzie river and Banks Land, and the place where we strike land after the sledge journey; *ethnographical* investigations, wherever Eskimo or remains of them are found; *hydrographical* observations in and about Bering strait; and *meteorological*, *magnetical*, and *tidal* series during the winter stay on Banks Land.

EINAR MIKKELSEN.

Before the paper, the CHAIRMAN (Sir THOMAS HOLDICH) said: I think I shall be echoing your sentiments as well as my own when I say that we greet Sir Clements Markham here this afternoon with great cordiality. We are exceedingly glad to see him amongst us; not that any of us have the least doubt about his undying interest in the affairs of the Society, but that we are glad to see him well enough to come out on a day like this to address us on this the first meeting of this session; and as he is on ground which we may call peculiarly his own, I think he cannot fail to give us a paper which certainly will be full of interest, and which will, I hope, lead to valuable discussion afterwards. I will ask Sir Clements Markham to read his paper.

After the paper, Admiral PARR: As Sir Clements Markham has mentioned the subject of driftwood, and referred especially to the driftwood in the expedition of 1875–76 with Sir George Nares, I thought it might be of interest if I brought up a specimen, which I think is one of the most interesting specimens that were obtained, and why it arrived at the position it occupied we were never able to ascertain, and I have had no explanation up to the present of how it got to the position in which it was found. Perhaps I might just read what Sir George Nares said in his official report, when he first came back, with regard to driftwood—

"The few pieces of driftwood, all of the fir or pine species, that have been obtained on the shores of the Polar sea, have evidently drifted into the position in which they were found from the westward. One piece was obtained lying on the surface of the sea-ice itself, 2 miles distant from the land; the rest were found on the shore at different heights above the sea-level of 150 feet. The former was perfectly fresh, with the bark on; the latter in all stages of decay, usually embedded in the mud of dry ancient lakes, evidently formed by the rising of the land, and of very great age."

It seemed to me that the reason why so little comparatively fresh driftwood was found in our expedition was that the bays between the *Alert's* winter quarters and Cape Josef Henry were all practically blocked by permanent ice, and in the front of many of them were floes similar to those referred to by Sir Clements Markham as existing at Banks island, namely, those domed floes which it was almost impossible to walk over, the domes being formed of hard slippery blue ice; and if it were blowing, you had to get across them as best you could, crawling along, because it was impossible to walk. All the bays being closed by this permanent ice, the driftwood would have had difficulty in getting in. But this particular piece, which Sir George Nares referred to as being picked up 2 miles from land, was found by my sledge crew on one of the first journeys that we took,

lying on the surface on one of the very thick floes. The floe must have been, I suppose, 80 feet thick at the very least, and this was lying on the surface without being sunk in at all, and towards the middle of it. I was not with my crew when they picked it up, but, following them afterwards, I came to the spot, and picked up the bark, which they had not thought necessary to take with them; and here is a portion of the wood. It was perfectly fresh at the time it was found, with the bark on it, and about 2 feet long, probably a bit of branch not quite straight. Well, how that piece of driftwood got into that position has been a mystery to me ever since. We never were able to find out.

Sir CLEMENTS MARKHAM: How far was it from land?

Admiral PARR: Two miles, and on one of those very old floes which could never have got close to land unless there was deep water, and, of course, it could not have got that piece of wood on it anywhere within hundreds of miles of where we found it. Then, in addition to that, Sir Clements has mentioned the migration of the Eskimo, and I thought it might also be interesting if I brought here an Eskimo relic, which I think is the most northern that has ever been obtained. It was picked up just to the south of Cape Beechey, in 81° 52′, and at that spot we found Eskimo summer encampments, while further south we found their winter ones; but that was the most northern point at which any traces of Eskimo were discovered. These are other pieces of wood which were picked up on shore.

Sir CLEMENTS MARKHAM: Is that driftwood or pieces of wood belonging to the Eskimo?

Admiral PARR: They were picked up on shore, where I cannot say definitely, but somewhere near the winter quarters. But they are all very extensively withered, while this which was picked up on the floe was perfectly fresh.

The CHAIRMAN: Is that poplar or pine?

Admiral PARR: This, I imagine, is poplar—I think it is one of the poplar specimens, but I am sorry I have not any bark. Colonel Feilden had it cut up after he returned home, and he sent me this piece to keep.

The CHAIRMAN: Perhaps Mr. Mikkelsen will say a few words.

Mr. MIKKELSEN: I think I have already told you all I have to say. I have decided to take one pony instead of going with dogs alone.

The CHAIRMAN: Where are you going to get your pony?

Mr. MIKKELSEN: Siberia. In addition to the food we carry ourselves—we have at least 250 lbs. of meat—the pony can draw at least 800 lbs., and it eats in 20 days about 250 lbs.; that leaves 550 lbs. clear after we have been out 20 days. I have tried ponies in Franz Josef Land, and found them very good indeed. And then, instead of going down to Mackenzie river, I intend to go with a whaler, and try and do some work in the Bering strait. It seems desirable to get some work done there. I don't think I can say any more.

The CHAIRMAN: I am sure all the company here wish you every success.

The CHAIRMAN: We have a letter written to Sir Clements Markham by Admiral Markham, which you might like to hear.

"I have read your paper with the greatest interest. It is an admirable and well-thought-out plan of campaign, and I am thoroughly in accord with all you have put forward. It is, as you state, quite time that we interested ourselves in a renewal of Arctic research, for it is just thirty years ago since we sent out our last expedition! Other nations have, however, not been idle during that long period, and much good work has been done. It is now time to take a broad and general view of what has been accomplished, to dovetail together the results that have been achieved, and then, as you say, to see exactly what remains to be done in

order to increase our geographical knowledge of the North Polar Regions. If Arctic research is to be renewed, then comes the important question as to the best locality for an expedition to be sent in order to obtain the most valuable and the most important results. I am certainly in favour of the scheme which you suggest, namely, to that large unknown area lying to the north and the north-west of the Beaufort sea. We all know that ice—and very heavy ice—will be encountered in that neighbourhood, but a sailing ship has already successfully forced her way through it, and I see no reason why a steamer should not meet with equal success. And we will, of course, hope that, unlike the sailing ship, the steamer will have a better opportunity of extricating herself when the work is accomplished. The theory that you have raised regarding the continental shelves of polar lands is exceedingly interesting, and may, or may not, be evidence of the existence of a large polar basin to the north, a basin in which no land is to be found. I must candidly confess that my own view was that if we could penetrate into the unknown area, we should, in all probability, find an archipelago, of islands, similar to those further south, extending towards and across the north pole. This opinion of mine —long formed—was somewhat rudely shaken by the report brought home by Nansen of the discovery of the large polar basin in which the *Fram* drifted for so long. You refer, in your paper, to the soundings I obtained in my highest latitude; that was, to my mind, at the time, conclusive evidence of the existence of land to the northward, and it was only Nansen's discovery that temporarily shook my faith regarding the existence of an archipelago. I was also much puzzled by the difference—the very great difference—of the conditions of the ice met with by me and by Nansen, for, whereas the ice over which I sledged varied in thickness from 80 to 120 feet, Nansen never encountered ice of a greater thickness than from 15 to 25 feet! I conjectured that the ice over which I travelled had been formed and held for long years in channels between islands to the north. I am, therefore, inclined to adhere to my original views that land, not continental, but in the shape of many islands, will be found to the north and north-west of Greenland. You have warned us not to be over-positive in geographical speculations, and I put forward this view with all due reserve. An expedition, however, such as you have suggested in your excellent paper will very materially assist in solving this interesting question."

Mr. RAVENSTEIN: I have never made the Arctic Regions a subject of special study, but I may say that I have listened with great pleasure to Sir Clements' paper, and am very glad to see that he comes back to his first love in his old days. If we look at a map like the one before us and see the immense space which is there covered by the Beaufort sea, we must see that this is a region which ought to attract explorers, and I am very glad to hear that two gentlemen are going to try their luck, and I do hope Sir Clements Markham will live long enough to induce the British Government to send out an expedition, and if not the British Government, perhaps the Japanese will.

The CHAIRMAN: Before asking you to join in thanking Sir Clements for his very able paper, I should like to ask one comprehensive question. As he has taken a very comprehensive view of the whole of the North Polar Regions, I should like to know whether—gathered from the evidence of all the different explorers, ancient and modern, who have wandered across those northern seas—it can be said distinctly that the ice of the North Polar Regions is diminishing. So far as I gather from the results of the *Discovery's* voyage towards the south pole, the glacier ice there is distinctly receding, and the volume of the ice generally appears to be diminishing. One would imagine that the Southern Polar Regions are in process more or less of desiccation. It would, therefore, be exceedingly interesting

to know—especially with reference to what Sir Clements has said about the migration of tribes up in the north and the existence of driftwood, which seems to point to a somewhat different climate in past times—whether the ice there is increasing, balancing, as it were, the decrease of the ice in the south. Beyond that, I fear that my knowledge of North Polar Regions does not justify me in making further remarks on so very able a paper as the one that our late President has given us.

Sir CLEMENTS MARKHAM: In the Arctic Regions we only have very small areas comparatively of inland ice. We have Greenland, some portions of the land opposite Greenland, and some portions of Franz Josef Land, but all very small areas compared with the Antarctic Regions, and the Parry archipelago is not laden with ice, so that it would be difficult to say whether the ice is receding. I believe it is not receding, so far as Greenland is concerned. But there seems to be evidence that the land is rising. In Banks island the wood was found at a very considerable height above the sea; I think, more than 100 feet. What was the height, Admiral Parr?

Admiral PARR: 150 feet above the sea.

Sir CLEMENTS MARKHAM: So that there seems to be evidence that the land is rising round the shelf, although Nansen discovered an immense depth more in the centre of the region.

Admiral PARR: I think the glaciers in Ellesmere Land, if I remember rightly, were decidedly receding. There were two glaciers which came down glacier valley, and there were moraines some distance below where the glaciers extended then.

Sir CLEMENTS MARKHAM: In south Greenland the ice comes down and it breaks off in bergs. But I do not know of any direct evidence of the ice having receded.

Admiral PARR: I think at Foulkner fiord the glacier was also receding; that was on the Greenland side, but it was some distance from the sea, and had not discharged into the sea for some time. But further north the Humboldt glacier and Peterman glacier were still discharging into the sea.

Sir CLEMENTS MARKHAM: They are still discharging, but they may possibly be receding.

Admiral PARR: They may be.

The CHAIRMAN: The land of permanent ice is not coming southward?

Sir CLEMENTS MARKHAM: I think not. The most puzzling point connected with the paper I have been reading is certainly the driftwood—where it comes from. If it is not Siberian, it must come from that American coast, and how it can possibly get round to Grant Land is a most puzzling question. It probably may find some currents round the Polar Regions, but there is an enormous quantity in Banks island, and in Prince Patrick island especially there is a great deal of wood.

The CHAIRMAN: But none of the wood shows signs of an axe?

Sir CLEMENTS MARKHAM: I have never heard. After the migration of those people along the coast of Parry islands, they appear to have separated on the entrance of Wellington channel—one set went down Lancaster sound and established themselves on the west side of Baffin's bay, and the other went up the channel, crossed Greely fiord, and were found by Admiral Parr and his shipmates far up Smith sound; then they appear to have followed down Smith sound. It is quite certain that the people, who were called Arctic highlanders, always had a tradition that they came from the north. For instance, they had no musk oxen, but they had the name, and they knew they had once had them. And there was certainly no communication between those people and the Eskimo in South

Greenland, none whatever, so that that is a distinct proof that they have come some great distance from the north and west.

The CHAIRMAN: That leads to the presumption that the north was warmer than it is now.

Mr. MIKKELSEN: I should like, if any gentleman present can tell me, to know where all that ice goes. If the polar ocean is like what it looks on the chart, where all that ice is going to seems to be a puzzle.

The CHAIRMAN: I have only to ask you to join in a hearty vote of thanks to Sir Clements Markham for his paper this afternoon.

THE LATE BARON VON RICHTHOFEN ON ANTARCTIC EXPLORATION.*

THIS is a memoir on the objects of south polar exploration by the late Baron Richthofen, which was left unfinished at the time of his lamented death. The great geographer stood in the very first rank among living cultivators of our science, and any words that come from his pen, more especially when they are practically his last words, will carry great weight. We find him, then, in these last words, in eloquent sentences which, alas! remain unfinished, dwelling upon the great importance of Antarctic research, not only from a scientific point of view, as adding to the sum of human knowledge, but also from a practical point of view. His interesting remarks will serve as a reminder that much work still remains to be done, and that for researches to be complete they must be continuous. It is discreditable that this country should be contented to see one great success achieved, and then drop the subject for half a century. If the great and important work which Baron Richthofen was engaged in describing when he was called away is to be completed (and it ought to be completed) there must be continuity—continuity of purpose and continuity of aim.

After describing the great difficulties and the results of the German Antarctic Expedition, Baron Richthofen offers a generous tribute of praise to Captain Scott and his fellow-explorers. He then refers to other expeditions. But the important part of his memoir is devoted to the results of Antarctic exploration, and this remains unfinished. The completed portion is well deserving of close attention, because it points to the necessity for continuity of effort. The following extracts will justify this conclusion.

C. R. M.

"The desire to seek out and to understand the scientific causes of phenomena, and to increase the sum of human knowledge, is a great aim. This is what led to the despatch of the German and English

* 'Ergebnisse und Ziele der Südpolarforschung,' von Ferdinand Freiherr von Richthofen (Berlin, 1905).

expeditions. Numberless problems offer themselves. The first is the form of the Earth. A great international work was undertaken for measuring the world with the most perfect methods. This will soon be completed as regards Europe, as well as Asia and Africa. But the work must remain imperfect without exact knowledge of the polar regions.

"The discovery by Nansen of a very deep ocean in the Arctic area is of the greatest importance. The Arctic expeditions leave no doubt of the existence of a great and lofty continent in the far south. This throws full light on other questions, and brings into order what was already known of the globe. An ocean is presented to us in the north polar region, surrounded by a ring of land. This land collects, during the summer thaws, a great quantity of ice, which in the course of centuries becomes a still-increasing mass, while a current keeps the way open between Europe and Greenland. This is the cause of the difficulty of navigation—the packing of ice, the floes, and the many hindrances to reaching the north pole.

"At the south pole lies a continent surrounded by a great ring of water. Gigantic masses of tabular ice come from the continent, and slowly melt. So here is a great problem with reference to this difference between the north and the south poles.

"All these questions, which continually increase, have been touched, but not answered. . . .

"There are also geological problems. The ice contains stones brought from some Antarctic continent, and is often full of them. When the ice melts, these stones, often great blocks of them, sink to the bottom of the sea. Sometimes they are found in dredging-nets. The greater part of them belong to very early formations, but they are mostly in small pieces. The geologist of the *Gauss* found a great number. If remains of land plants and land animals are found, we have evidence that there was formerly a land with a different climate. The Swedish expedition found fossils both of plants and animals. But large collections are needed to enable us to come to any certain conclusion.

"Among problems to be solved are the relationship of the present fauna and flora in countries far removed from one another; for example, New Zealand and South America. It may be expected that traces of communication will be found in the Antarctic Regions.

"The glaciation round the poles claims the first interest of the inquirer. Everywhere a steep cliff of 30 to 40 metres in height is encountered in the south. The table-shaped plateaux spread over an area of several hundred square kilometres of flat surface, extending from 200 to 400 metres beneath the sea. Pieces of the cliffs escape and float away, until they attain a great eastern distance, drifting with the current. When winter comes they are imprisoned in the ice-floes.

"It is already known that the south polar ice-drift is of great

extent. Information on this subject is now collected and shown on maps. As the ice melts pools of water form, very poor in salt, but of great importance for organic life. The ice-floes extend to the high land, and there remain fixed. The stones they contain is a proof that they must have been attached to the land. In the structure of the tabular masses lies the history of the ice, and only in our day have we learnt how to direct questions to Nature on this subject. In working out the materials collected, results of interest will probably be obtained.

"We can guess that the greater or less heaping up of ice round the poles may explain the phases of changes in the climates of the world. We know, from careful observations, that the beautiful heights of our Alps already show that their ice-covering is diminishing. The same thing is taking place in the Andes of Ecuador and on Kilimanjaro. In the Arctic Regions the recession of the ice has also been noticed. When from this we conclude that there is now less precipitation, that view is supported by the continual desiccation of Africa and the interior of Asia. A few remains of forest, and an ancient tree here and there, bear witness that there was at one time a damp climate. The trees disappear, and no new ones grow. All points to a general drying up.

"It is now an important question whether this is also the case in the Antarctic Regions. Is this withdrawal observed there, or is it different from what has been observed in the north?

"The Frenchman Adhémar, sixty years ago, sought to prove that ice-action, at both poles, changed in cycles; that in the glacial ages the ice extended from the Scandinavian interior ice to the Risengeberge, and the north pole was ice-covered, while at the same time the south pole was comparatively free, and that in our day this is reversed. We now think that this was not the case, but that probably the whole globe, in the glacial age, was cold and desolate.

"These questions can now only be solved at the south pole. At a spot visited by Ross there were exact observations. They show that the ice-edge of Ross is now thirty miles further south than it was in his day, and that the glaciers of Victoria Land have gone far back. In Ross's time the glaciers reached the sea, but they no longer do so. The German Antarctic Expedition discovered traces of glacier recession on Gaussberg. It was necessary, in order to determine the rapidity of this recession, to decide the present position of the ice by measurements, in order that future observers may be able to ascertain changes that have taken place in an interval of a few years.

"So far as we can judge, this retirement of the ice-cap is of the highest importance for future generations. Still, at any moment changes of an opposite character may take place; and to recognize the changes certain lines are necessary, such as were fixed at the Gaussberg.

"Another class of observations has reference to the polar oceans: their depths, the quantity of salt and gas they contain, their temperatures

and currents on the surface and at various depths, as well as the influence of floating and melting masses of ice. Knowledge of the sea is a great and special branch of scientific inquiry, and the methods of conducting it are becoming more and more perfect.

"These researches may be undertaken for their own sakes. Still, they lead to results of great importance, not only with regard to a knowledge of the ocean, but having reference to practical consequences which touch more and more on domestic life. Far-seeing researches in recent years show that the changes in the distribution of ice, and the currents in the sea round Greenland, have an important influence on changes of climate in Germany. The time does not appear to be distant when it will be possible to predict the character of the seasons months beforehand. This is only the beginning of the practical use of these researches. The more scientific use of the seas as fisheries will also be of great importance.

"Here, in an unexpected way, the practical value of polar research shows itself, by opening a wide view of the life-conditions of plants and animals. In former days men carelessly enjoyed the treasures offered to them by this apparently endless scene. Since then there has been great destruction, and now the rational use of the sea has become a problem of importance. Just as agriculture has made great strides in a knowledge of the cultivation of plants, so now we must turn to the sea for supplies.

"The progress made in a short time in this direction is prodigious. Now all the higher and the lower animals are seen to depend on each other, even to the smallest animal organisms, and these, again, need their food. The plankton discoveries show plant-like organisms of microscopic size which flourish on the surface of seas, sometimes in great quantities, while sometimes there is none. The curious fact is that these means of nourishment do not, like land plants, flourish best in the tropics, but, on the contrary, in the coldest polar seas, or where cold currents flow from them. In many places the sea is coloured green from this plant life——"

TRAVEL AND EXPLORATION IN THE SOUTHERN JAPANESE ALPS.*

By the Rev. WALTER WESTON, M.A.

THE islands of the Japanese archipelago—likened by the fertile fancy of native geographers to garlands of flowers festooning those Far Eastern seas—really represent the crest of a stupendous mountain chain that rears itself from the profoundest depth of ocean ever yet

* Read at the Royal Geographical Society, November 6, 1905. Map, p. 128.

fathomed. From the bottom of that portion of the adjacent bed of the Pacific ocean, known as the "Tuscarora deep," to the top of Japan's loftiest peak, the far-famed Fujiyama is an altitude of 40,000 feet. There is probably no other region in the world, of an area so comparatively limited as that including Fujiyama and the Tuscarora basin, that can show such an extraordinary difference of level.

The general characteristics of this gigantic mountain ridge unmistakably prove its close kinship to the mainland of Asia. Japan, at length acclaimed the true pioneer of moral and material progress in the Far East, already, though unobserved, itself occupied a geological position symbolical of it, for its long sinuous island chain forms nothing less than the advanced frontier of the Asiatic continent. The ocean bed between Japan and Korea is so shallow that very slight uplifting of it would be needed to afford dry-land communication between the two.

The mountain ranges of Japan, from their general formation, may be divided into two main systems, the northern and the southern, or the Russian and the Chinese.

The Chinese or southern system is connected with South-East China, and runs north-east by way of Formosa up into the mainland of Japan. The Russian, or northern, is known to Japanese geographers as the Karafuto system. Karafuto is the Japanese name for Saghalien, "Saghalien" itself representing the aboriginal Ainu name *Saharin*, the "wave-land," in allusion to its mountainous character.

The Karafuto system enters Japan from the north, and runs south-west until it meets the southern system in the middle of Japan, which thus becomes, so to speak, the geological battleground of the two conflicting chains, the Russian and the Chinese. It is here, in the broadest part of the main island, that the deepest and wildest valleys are cleft, and the mountains rise to their loftiest heights, in the picturesque summits known as the Japanese Alps.

The conflict or meeting of these two great systems, Russian and Chinese, naturally results in terrific upheavals, and a vast transverse cleft, or fissure, crosses the island at its widest part, through which a number of great volcanoes have burst their way. This fissure is known as the Fossa Magna. It constitutes the geological boundary between northern and southern Japan, whose features present marked contrasts, for whilst northern Japan is comparatively low and open, the southern division, especially its central regions, includes the wildest and most magnificent scenery in the empire.

The chain of erupted peaks in the Fossa Magna forms the Fuji volcanic range, which is of great interest. It stretches from near Naoetsu, on the Sea of Japan, right across the island, and culminates in Fujiyama, then passing out by way of the Hakone hills and the promontory of Izu into the curious island chain known as the "Seven

Islands of Izu." One of its most familiar peaks is the Ōshima island, so often seen smoking away by travellers approaching Yokohama from the west. In a very interesting tour last summer, my wife and I traversed most of the principal peaks of this range on the mainland, some of them being then ascended for the first time by a European lady.

The great mountain range known as the "Japanese Alps" crosses the main island, as I have said, at its widest part; roughly speaking, from the bay of Toyama on the north, to the bay of Suruga on the south. Some years ago I had the honour of reading a paper before this Society on "Exploration in the Japanese Alps," in which I dealt with some six seasons of travel and mountaineering in the northern half of the range. To-night I am to speak of journeys during eight seasons in the southern half, and in the Fuji volcanic chain eastwards. For the sake of clearness, this portion may be called the mountains of Koshu, from the remarkable province in, or on the borders of which, most of the principal peaks are situated.

The mountains of Koshu form an immense triangular mass mainly enclosed by the river Tenryugawa on the west, and the Fujikawa on the east, the apex of the triangle being formed by the famous Lake Suwa. The geographical title of this mass, suggested by Dr. Naumann, is the Akaishi Sphenoid, from the name of one of its loftiest peaks and the wedge-like shape of the whole. The geological formation is chiefly Palæozoic. It is, roughly speaking, formed of three nearly parallel ranges running north and south, the Akaishi on the west, Shirane in the middle, and the serrated granite peaks of Komagatake on the east. I was told that until I ascended the main summits, to which I shall refer, scarcely any of them had been previously visited by European travellers.

The average height of the loftiest peaks is about 10,000 feet, but the character of the scenery, grand though it is, is hardly so wild and rugged as that of the barer, less richly wooded mountains in the northern half of the Japanese Alps, such as Hodakayama and Yarigatake. The nearest and most accessible town of importance is Kofu, on the east, the capital of the province of Koshu, which is connected by rail with Tokyo, six hours distant, the picturesque route leading us through the longest tunnel in Japan, $3\frac{1}{4}$ miles in length, under the Sasago pass. Kofu (population 40,000) is one of the most progressive towns in Japan, and stands in a broad, fertile, mountain-circled plain, once probably the bed of an ancient lake, now dotted all over with thriving villages. It is the centre of a considerable commerce in silk, grapes, and paper. Some of the silk filatures employ several hundred persons, chiefly young girls, whose hours are said to be fifteen per day, without a break for meals or even a Sunday holiday, and this continues all the year round, with the

HODAKA-YAMA, FROM YARIGATAKE.

SHIRANE ·SAN, WITH KAIGANE (10,334 ft.), HIGHEST POINT, ON RIGHT.

(Taken from hills above Shoji Lake at west foot of Fuji San.)

KOMAGATAKE (KOSHU) FROM NEAR SUMMIT OF KAIGANE.

EDGE OF WESTERN LAVA STREAM OF FUJI SAN, NEAR THE LAKE OF SHOJI.

exception of two months in the winter. Until lately the trade with the coast has been carried on by means of pack-horses over the hills, or by hundreds of boats down the river Fujikawa; but these have been practically replaced by the railway which now joins Tokyo with the fertile regions of Central Japan.

On some of the main roads runs a remarkable and very popular vehicle, known as the *basha*, a cross between an ambulance and a hearse, whose behaviour frequently suggests the probability of its employment in the capacity of one or other of those conveyances. Its repeated use in emergencies was one of those fond delusions to which one sometimes so unaccountably clings (and the *basha* needs energetic clinging to), for its speed only averages 3¼ miles an hour, and a day out in it always struck me forcibly as one of the most violent forms of exercise in which a man of robust health and nerve is justified in indulging.

The use of the *basha*, however, can only be enjoyed in the plains and on the more level roads. It must then give way to the pack-horse, from which finally one's baggage is transferred to the backs of sturdy peasants and hunters. These hunters are capable of carrying great loads, which they fix on a wooden frame (similar to those used in the Alps), known as *yasemma*, or "scraggy horse." Some of them were my companions during many expeditions, of which the climb of Kaigane, 10,334 feet, the highest of the Koshu range and the culminating peak of the central mass, may serve as a specimen of mountain travel in this region. Of this fine peak I made the first ascent (by a foreign traveller) three years ago, repeating the climb last summer. A short day's journey westwards across the Kofu plain took me through a curious natural gateway in the foothills up a beautiful valley, where Ashiyasu lies, 2200 feet, a hamlet of dark scattered chalets that cling with difficulty to the steep and broken slopes and ledges that rise high above a wild torrent bed. Picturesque they are, but it was distance that lent them their chief charm, for their most striking actual features can be neither photographed nor described—their squalor and their odours. One soon ceases in these lower inhabited valleys to be surprised at anything one sees, and at nothing that one smells. All, however, was redeemed by the delightful courtesy of the kindly village headman, Natori Unyichi, the whole resources of whose establishment were put at my disposal, a perfect stranger in a house that had never sheltered a foreigner before, nor heard of a foreigner's strange wants and ways. No sooner had I made known my purpose than he hastened to do all in his power to further it. The way to Kaigane was little known, he said, and very rough and fatiguing, if not perilous, but, if I would be content with the company of a trio of bear-hunters, he would get me the best he could find. These duly arrived, and offered most respectful greetings, though somewhat shy on their first introduction to a *gwaikokujin*, "an outside countries man." They proved delightful companions, willing, thoughtful,

and most eager to please. I met them with interest, and at last parted with genuine regret.

Our first day's journey began with an early start from Ashiyasu, at which the whole strength of the juvenile inhabitants turned out to assist—a motley crowd of jostling, wild-eyed, and incredibly filthy little people.

As we passed the village shrine, my hunters turned aside to offer a prayer for protection and success, exactly as, a dozen years ago, my Swiss guides had done on the way to the Matterhorn.

A fatiguing scramble of five hours in a scorching sun placed us on the top of a ridge, 6500 feet, commanding a fine view towards Fuji, some 30 miles distant, and of part of the upper reaches of the Fuji-kawa, where it leaves the Kofu plain. Close by grew large quantities of a wild raspberry of enormous size, called *kuma-ichigo*. A rough descent of four hours took us down to the bed of the picturesque Norokawa, one of the torrent-feeders of the Fujikawa, and a still harder struggle of four hours more was needed before we could shelter for the night higher up the valley. Sometimes we had to wade from side to side, up to our waists, in the ice-cold stream, or leap from rock to rock at the side. Occasionally we had to spend half an hour in felling and fixing a tree-trunk, 20 or 30 feet in length, to serve as a bridge. Daylight was dead and the ravine wrapped in darkness long before we could gain our bivouac, and the last hour's work was only accomplished by the faint glimmer of an Alpine lantern, where a slip, unroped as we unavoidably were, would have plunged one into the roaring, swirling torrent with little chance of rescue. Our fourteen hours' scramble at last ended at a spot where, at 5500 feet, in the tangled undergrowth and trees on the left bank of the stream, a dilapidated hut of birch-bark betokened a shelter used by hunters and woodcutters, the sole visitors to this lonely valley. From the low smoke-blackened roof on a tough creeper hung an iron cooking-pot, and this, with a chamois-skin, formed the sole furniture of the hut. However, we spent two comfortable nights under its shelter, the intervening day being occupied by my hunters in fishing, for these streams abound in small trout of half a pound upwards in weight, and a dozen or so are soon taken. On the second morning I started at early dawn with my two strongest men, leaving the oldest of the three to guard the hut and our belongings in our absence. Fording the torrent, here 100 yards in width, we crossed to the right bank and began a rough scramble of six hours up a steep buttress towards the summit of Kaigane, which rose finely above a great ravine known as the O-Kamba. Forcing our way up torrent beds and over the interlacing roots of the *kamba*, or giant birches, or of pines on the lower slopes, we suddenly came upon the rotting, shattered timbers of a little shrine, once built by the father of the friendly headman of Ashiyasu for the worship of the spirit of the mountain. Here used to

TOP OF KAIGANE FROM SOUTHERN ARÊTE.

EAST BUTTRESS OF KAIGANE FROM NORTH.

come parties of hunters, sent as a deputation in times of drought to supplicate the *genius loci* for rain, on behalf of the peasants below. Now, however, an energetic and practical Meteorological Office, and improved methods of irrigation, are influencing them otherwise, and the sacred building, I was told, would never be restored. Beyond the forest came a broad belt of *haimatsu*, or creeping pine; and above this, to the south, towered the bare grey crest of the triangular summit of the mountain. Alpine flowers of every hue, in great variety, adorned the upper slopes.

Especially noticeable were a magnificent deep blue-and-white columbine (*Aquilegia akitensis*) at a height of 9500 feet, and the bright yellow *Potentilla gelida* on the actual summit. This I also found on the highest point of two of the other loftiest peaks in the range—on Ainotake, 10,260 feet, and on Senjodake, 9741. At intervals appeared quantities of the beautiful *Schizocodon soldanelloides*, a near kinsman of the Alpine soldanella, sometimes white, but more frequently a lovely pale claret colour. In the spring-time one finds it as low down as 3000 feet, but on Kaigane and Senjodake I gathered it as high as 9700 feet; varieties of saxifrage, a beautiful yellow violet, *Viola biflora*, *Geum dryadoides*, and many others abounded.

On the top, which commands an extensive and interesting prospect, I found a tiny wooden shrine enclosed in a little cairn, and in front of it a votive offering in the shape of a wooden sword some 10 inches long. Last year, when I made a second ascent of Kaigane by a slightly different route, I found the cairn destroyed and the shrine in fragments, and its place occupied by a surveyor's pole, on which fluttered the tattered remnants of a red-and-white signal flag. Even in these lonely mountain solitudes the finger of scientific progress is leaving its mark, and on every hand is some sign or other that the "old order changeth, giving place to the new."

The next morning early we descended to our hut, greatly to the relief of our old companion left in charge, and many were the kindly greetings and the attentions showered upon me on my return, after five days' absence, to the hospitable headman's home at Ashiyasu.

Of the fine granite peaks that form the east flank of the mountains of Koshu, the loftiest and most striking is Komagatake, close upon 10,000 feet, along the east base of whose lower foothills the railway from Kofu to Suwa is now being carried.

The summit commands a wonderful view on every side, and embraces all the loftiest peaks in Central Japan—a stretch of nearly 150 miles. It is adorned with the now familiar combination of votive offerings and surveying station side by side, but it would appear that the *genius loci* has still a considerable following, for many of the memorial stones and pilgrims' flags are quite new and substantial. On the occasion of my second ascent to the summit, I traversed the mountain—the first time for a European traveller, I believe—by getting down

on the west side, and so again reaching the headwaters of the Tenryu-gawa in the neighbouring province of Shinshu. This involved the descent of 5000 feet of very steep and broken granite cliffs, a work of nearly five hours' continuous exertion, and then four hours more were needed before we reached our shelter for the night. At the foot of the last precipice, on which dark pines grew thickly wherever they could find a footing, my hunters turned aside, and led me to a spot, where, on a little shelf of rock, lay the decaying remains of a little shrine. Inside it were a human skull and a few bones, all that was left of a lost chamois-hunter, whose body had been found many years before at the foot of the cliffs we had just descended.

A rich harvest of Alpine flowers awaits the attentions of botanists on this fine mountain also. At a height of 7000 feet most exquisite rhododendrons, of a delicate cream colour, light up the darkness of the silent pines, and occasionally the delicate waxen stem of the "Indian pipe" is seen close by.

The southerly neighbour of Komagatake, Huzan, the "Phœnix" peak, is one of the most striking summits in the granite range. Until last summer it was held to be inaccessible to human foot. Even Dainichi Nyorai, the famous Buddhist saint, is said to have himself returned vanquished, and he had to leave his memorial stone at the foot of the final pinnacle of granite, which rises from a precipitous disintegrating ridge to a height of 9500 feet. To it the comment of a native Japanese geography, speaking of this range, applies with special force: "This is one of the most mountainous regions, and there are in it trackless wilds, for these mountains are almost beyond the ability of human legs to climb."

From the house of my friend the headman of Ashiyasu, a fatiguing climb northwards of eight hours landed us at our bivouac, a ruined woodman's shelter on the south flank of Huzan, high above the valley of the Norokawa, and looking westwards over towards Kaigane. The altitude is 8000 feet, and a crystal spring of icy-cold water rose hard by.

A three hours' climb the next morning led us over the intervening peak of Jizodake, 9700 feet, to a low saddle between it and Hoozan, and close by, at a height of 9000 feet, I found a beautiful dwarf rhododendron, *Schizocodon soldanelloides*, and a lovely orchid (*Cypripedium Yatabeanum*), besides many other Alpine plants amongst the straggling *haimatsu* (creeping-pine) below the ridge. As we passed along the gap, my three hunters were suddenly thrown into a state of wild excitement by the appearance, on a sort of promontory jutting from the gap into a wild ravine on the left, of an *iwa-shika*, or chamois. Without a further thought of the main object of our climb, two of them flew off like monkeys to stalk the animal, having only one rifle between them. They were soon lost to view in the ravine, and my

KOMAGATAKE (KOSHU) FROM NEAR SUMMIT OF KAIGANE.

EDGE OF WESTERN LAVA STREAM OF FUJI SAN, NEAR THE LAKE OF SHOJI.

remaining companion and I were left to finish the ascent as well as we could. The ascent of the final peak I made alone, after several hours of unusually severe exertion, which my companion refused to share. On the descent, shortly after leaving the saddle below Hoozan, we met our truant companions, one of them carrying the carcase of the chamois, which they had successfully stalked in the ravine below. It was a fine buck, about five years old, weighing some 70 lbs. Without ceremony they laid it down, cut it open, and at once invited me to partake of the choicest parts of the internal organs, explaining that this would ensure me a share in the animal's own desirable attributes

HUZAN FROM SOUTH. FIRST ASCENT WAS MADE JULY, 1904.

of speed, agility, and strength. As I was just engaged in a hard-earned lunch of my own, the gruesome invitation proved somewhat untimely, but that night in camp we supped royally. For several days after this, the chief topic of conversation amongst my men invariably had reference to this first ascent of Huzan, thrilling accounts of which, duly embroidered, were from time to time detailed by the only spectator of the climb.

They finally approached me with a somewhat startling request. It was no less than that I should, as the first to succeed on the "Phœnix peak," where the great Dainichi Nyorai had failed, build at its foot a shrine in honour of the divinity of the mountain, and myself become its first *kannushi*, or guardian priest. It struck me as

the most novel offer of preferment, and the most singular proposition for church-building I ever received!

With regard to the summits of the Fuji volcanic chain, I must only speak of them in passing. Of these, Kengamine, the "Sword peak," my wife and I were the first foreigners fortunate enough to succeed in ascending. A curious feature of several of these volcanoes is the loftier and newer cone rising from within an older, lower, and more broken one. Some of the old shattered ridges are extremely steep and narrow, and afford excellent scrambling. On Kengamine, one *mauvais pas* is known as the "Ants' causeway," where a thin crest, some 50 yards long and 2 feet wide, falls nearly sheer on either side for 200 feet or more. It is regarded as a great work of merit to pass safely across, and, after some hours of exertion, to gain the summit. Those who succeed, and have patience enough to spend a night there, are promised at sunrise a vision of Amida riding on a cloud of rainbow hues.

Miyokozan, the northernmost peak of the system, is a good specimen of the double-topped volcano, especially as seen from Akakura, a quaint solfatara hamlet near its foot.

Yatsugatake, the "eight-peaked" mountain, 9784 feet, rises a short distance north of the Kofu plain, and offers one of the most fertile fields for research in Japanese Alpine botany. Mrs. Weston and I crossed it last year from east to west, and spent some days at an interesting *yuba*, or hot spring, 6600 feet, on its east flank. Amongst the flowers specially noticeable is a beautiful black lily (*Fritillaria Kamschatensia*). On the west, at 5500 feet, we found black currants growing wild, this being only the second or third occasion on which I have observed them in the main island of Japan.

Of Fuji itself the fascination never fails, while some fresh feature constantly attracts attention. This I found especially the case during some of my journeys on the Koshu side of the mountain. On the north-west flank a mighty lava-stream once swept down until its course was arrested on the flanks of the hills which hem in the southern part of the Kofu plain. The line of division between the two formations is so distinctly marked that one can step off from the wrinkled lava on to the Tertiary sandstone or conglomerate in a single stride. A chain of lovely lakes, about 3000 feet above sea-level, is formed in some of the deeper hollows of the line of demarcation, and it is said that the level of their waters maintains a constant variation. At the foot of a low hill called Murayama, between the lake of Shoji and the actual north-western foot of Fujiyama, several interesting natural ice-caves have been formed by the moisture which percolates through the porous lava, and freezes in the form of beautiful stalactites and stalagmites of ice. One of these (3500 feet) I explored in the month of May, descending the bell-shaped vertical entrance, some 30 feet in

depth, by the help of a strong rope and the trunk of a pine tree. Our lighted torches disclosed a weird and beautiful scene; but the passage of the cave, nearly 400 yards in length, was a somewhat trying experience, owing to the mixture of broken blocks of lava and bosses of now melting ice over which we had to pick our way.

There are several similar, though less striking, caves in this region, and I have heard that one of them supplies a considerable amount of ice to the neighbouring villages in hot weather.

On the outside of the crater edge, near the highest point, are several cairns and other receptacles for scientific instruments, with which valuable observations are carried on by the staff of the Imperial Meteorological Department. It is odd to see, side by side with these at early dawn, the white-robed pilgrims take their stand to pay their devotions to the rising sun. It presents one of those contrasts that so often seem in rural Japan to make one doubt whether we are living in the tenth or the twentieth century.

A curious instance of this befell me some years ago, when making one of the earliest recorded ascents of Fujiyama while the mountain still wore the snow-mantle that in the spring-time adorns the upper 6000 feet. With my friends, Messrs. Noel Buxton, M.P., and H. W. L. O'Rorke, I called at Omiya, a village at its western foot, to obtain supplies and coolies for the ascent. These were only procured with the greatest difficulty, for we were assured that, as the goddess of the mountain was only "at home," so to speak, to travellers after its formal opening at the end of July, we should surely meet with disaster if we called nearly three months too soon. Oddly enough, no sooner had we reached our bivouac that night, in a broken-down hut in the forest, than a frightful typhoon burst over the mountain, and we were imprisoned there for several days. Ultimately the weather cleared, and we succeeded, in seven hours, in reaching the summit, though all but one of our coolies deserted us at intervals through fatigue or fear. Inspired by the marvellous beauty of the view, which in the early spring far surpasses that at any other season, we decided to descend by a different route, and therefore crossed the mountain to Gotemba, so that our Omiya friends saw us no more. Some days later the native newspapers came out with thrilling accounts of a frightful disaster on Fujiyama, stating that "a party of foreign travellers (supposed to be British, as they alone take pleasure in such risks) had started to ascend the mountain. As, however, a typhoon shortly afterwards broke over it, and nothing has since been heard of them, they have, without doubt, miserably perished."

May I now briefly refer to some other interesting features of this region, and, first of all, to the two chief rivers in whose embrace the great mass is held.

Of these, the Tenryugawa—"the river of the Heavenly Dragon"—

drains the western portion. It rises in the beautiful Lake Suwa, which was once the crater of a gigantic volcano, and whose waters are frozen so hard in winter that heavily laden horses can cross. The lake is about 2½ miles long and nearly 40 feet in depth, but it is said to be slowly filling up. Its neighbourhood is noted for its hot mineral springs, and also for the finest silk produced in Japan.

The Tenryugawa, 150 miles long, flowing at first silently and gently from the lake's western end, gradually gathers strength during a course of 50 miles until at length it cleaves its way through the very axis of a mountain chain, to the Pacific, which it enters near Hamamatsu, on the Tokaido railway, 150 miles west of Yokohama. The river is navigable for boats for nearly the lower 100 miles, and the journey to the sea is of a most exciting character, shooting innumerable rapids and passing through magnificent gorges, with walls towering from 1000 to 2000 feet overhead. Some of the older bridges are very picturesque, but modern contrasts abound.

The Fujikawa, on the eastern side of the Koshu range, carries off the drainage of the mountains encircling the Kofu plain on every side. This plain is said to be the bed of an ancient lake, of which traces still remain. An old local geography (Kai-Koku-shi) states that a famous Buddhist priest, Gyogi, by birth a Korean, in the era Yoro (about 720 A.D.), dug a canal by which the waters of the lake found an outlet in the Fujikawa.

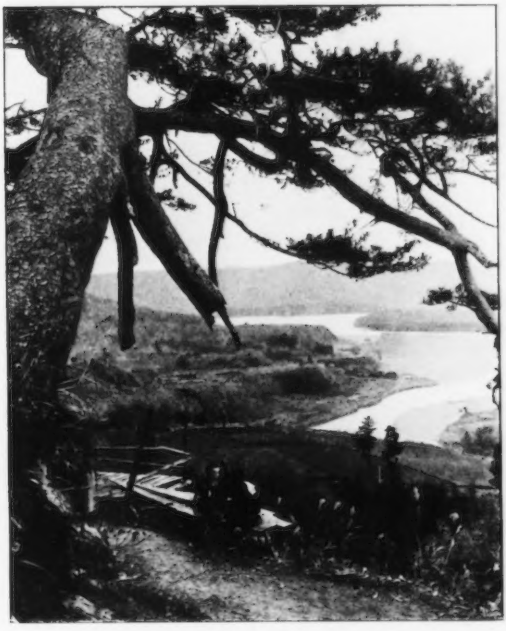
The flooding of these rivers, caused by the melting of the snows at the beginning of summer, and by the heavy rain-storms at its end, leads to repeated inundations, in which considerable destruction of life and property is frequently involved.

The Fujikawa, 100 miles in length, is also navigable for the lower half, from Kajikazawa to Iwabuchi, on the Pacific coast, and though the scenery is less wild and grand, there are features of considerable beauty. Some of the slender bridges of wire and narrow planks are interesting. The more primitive form of these is known as *mannembashi*, "the bridge of 10,000 years," owing to the sensations inspired by the passage of its quaking, swaying length. On the right bank, a few miles from the sea, are some remarkable upright hexagonal columns of andesite.

Although the waterfalls in this region are not numerous, there are several of great beauty, notably the *Shira-ito-no-taki*, or "White Thread cascade," at the west foot of Fujiyama. The stream rushes over the edge of a semicircular basin in the lava, separating into numerous falls of varying breadth, which are regarded respectively as the mother, father, and children, forming one huge family.

On the east side of the range hot springs abound, notably in the neighbourhood of the Fuji volcanic chain, near Lake Suwa and further south. At one of these, Shimobe, a solfatara near the left bank of the Fujikawa, people will sometimes stay in for a month at a time, taking

CRATER OF FUJI SAN. WESTERN SLOPES LEADING INTO CRATER AT THE ONLY ACCESSIBLE POINT.



IN THE VALLEY OF THE FUJI-KAWA.

the precaution, however, of laying a heavy stone on the knees at bed-time, to guard against turning over while asleep. Both sexes bathe together, and the utmost decorum prevails.

Minerals of various sorts abound, though not usually in great quantities. Gold is found in quartz veins, and also in the river-bed, in the valley of the Hayakawa, a tributary of the Fujikawa. On the fine granite peak of Kimpuzan (8370 feet), which I ascended in the spring of last year, are found opals, copper, and the most magnificent crystals in Japan. One crystal mine employs no less than three hundred persons. Near Toyuka gypsum and alabaster are found, whilst in the Hayakawa valley, again, at Suzuri-jima, a much-prized compact clay slate, used for *suzuri-ishi*, or "ink-stones" (for rubbing Chinese ink), is quarried. Slate for house roofs, though too scarce for general use in Japan, is quarried at Ikawa, a village on the headwaters of the Oigawa.

The Fauna of the region is interesting. A black bear, sometimes as much as 6 feet long, is occasionally killed, and last year two cubs, which, with their dam, had been trapped near Ashiyasu, were offered me for sale, The *iwa-shika*, or Japanese chamois, is quite common. It differs from the Alpine variety in having a bigger head and legs, with shorter horns. A fine mountain deer is hunted in the cold weather, when driven down into the valleys by deep snow and by wolves and other beasts of prey. Its skin in winter is thick and brown, but in summer it is a dappled fawn colour. Boars and wolves are sometimes found, and among the pine forests an ugly red-faced monkey has his home. He is said to be unusually cunning, and to be capable of self-defence by throwing sticks and stones at his pursuers. His fur in winter is exquisitely soft and thick, of a beautiful dark grey, and he chiefly lives on tree-shoots, leaves, and vegetables. Badgers, foxes, and hares which turn white in winter, martens, and tiny beautiful brown squirrels abound, the badgers and foxes especially being greatly feared for their alleged powers of bewitching people. Near Lake Suwa are found wild cats with long tails, quite different from the ordinary tailless or short-tailed varieties elsewhere.

With regard to birds, there is a singular deficiency, though sometimes a splendid golden eagle is seen, and hawks are numerous low down. Occasionally the gorgeous copper pheasant flashes through the pine trees, where also the sweet note of the Japanese nightingale is heard; and absurdly tame ptarmigan, which turn white in winter, are very common among the creeping pine at a height of 8000 or 9000 feet, where they love to feed on the young shoots of the crowberry. It is known as *rai-cho*, or "thunder bird," and is regarded as sacred to the god of thunder. Pictures of it are often hung up as charms of defence against lightning.

The Flora of the region deserves both careful and expert attention, but at present it has received comparatively little.

The commonest forest trees are oaks of several kinds, beeches, birch (of which on Kaigane there is a forest of magnificent size), maples, willows, and various conifers, noticeably *hi-no-ki* (*Chamæcyparis obtusa*), much valued for its useful timber. Higher up grow larches, and beyond them the *haimatsu*, or creeping pine.

A list of some of the Alpine flowers of which I preserved specimens may not be without interest. They were identified for me by Dr. Matsumura, the Professor of Botany in the Imperial University of Tokyo (see Appendix).

There is a remarkable difference in the climatic conditions prevailing in the northern and southern parts of the Japanese Alps respectively. In the former, near the Sea of Japan, the temperature is hotter in summer and colder in winter than in the latter, towards the Pacific.

In the case of the mountains in the northern half, the cold dry north-westerly winds of winter, sweeping across from Siberia, gather up the moisture over the Sea of Japan, and deposit it in a heavy snowfall that often nearly buries whole villages. Houses are then occasionally identified by sign-posts, such as "The Post-office is below," or "The Police Station will be found beneath."

When we come further south, however, except on the higher peaks, there is a marked contrast, especially near the Pacific coast. In place of the snowstorms of the north-west, with their leaden skies and biting winds, the winter weather is there usually bright and sunny, and the snowfall is comparatively slight.

The simple unaffected politeness, and the kindly hospitality one receives almost everywhere, leave the most delightful memories behind. Not only the village headmen, of whom I have spoken, but even the local country police whom one meets on the outskirts of the ranges, are always ready to further one's plans to the best of their powers. One to whom I once applied for information actually volunteered to climb my mountain with me, and proved a most excellent companion. He was very diminutive, but extremely dignified, and imperturbable under all circumstances. Even when, one night in camp, I unluckily rolled out of my hammock and landed somewhat heavily on him as he lay snoring peacefully below, his sole comment was a word of polite apology, "O jama wo itashimashita," *i.e.* "I am so sorry to have been in your honourable way."

As a rule, the peasant folk are very honest, a feature in which they distinctly excel the ordinary commercial classes in many of the larger, more "civilized" towns. The only robbery I ever suffered was in a strange out-of-the-world hamlet named Narada, in the upper valley of the Hayakawa. The place had only twice before been visited by Europeans, my own expedition two years ago with my friend, Mr. John Kennaway, being the first for eight years. Narada is a wild and

primitive spot, whose inhabitants all bear the same name, Fukasawa, and usually only intermarry among themselves. They looked poorly nurtured, and were dirty and unkempt beyond description, and I noticed that the almost invariable topic of conversation, in the strange and uncouth dialect they spoke with my hunters, was the price of rice, of which they, however, seemed to get very little. My belongings they eyed with intense curiosity, my camera and a pocket-book attracting special attention. The camera was pronounced by the most travelled inhabitant to be a telescope, but the pocket-book they are probably still investigating, for I was relieved of it and its contents during my short halt amongst them, and never saw it again.

Narada boasts of "seven wonders," said to have been bestowed by a princess named Nara-O, who "once upon a time" paid a literally "flying" visit to the Hayakawa valley. These wonders are as follows:—

1. A reed, called *kataha no ashi*, whose leaves grow only on one side of the stem.

2. A pair of crows, whose numbers practically never increase.

3. "*Sentaku-ike*"—a tiny pool whose waters never need the addition of soap for washing purposes.

4. "*Binroji-ike*"—a pond, in the mud of which articles of clothing, if left for a time, are dyed an inky black.

5. "*Shiwo-ike*"—a perennial pool of salt water.

6. "*Go-o-sui*"—"The August Princess's water," a spring especially efficacious in disorders of the stomach.

7. The last and crowning "wonder" of Narada is, that the princess ever went there at all!

My last two expeditions were made during the progress of the late war, and afforded frequent opportunities of observing how the everyday habits and the ordinary institutions of even the commonest peasants all play their part in fitting the Japanese soldier for fighting the battles of his country as few soldiers ever fought. The frugal food and shelter with which he is familiar at home help to prepare him for the hardships and privations of Manchurian campaigns, whilst the climatic conditions, varying as they do from semi-tropical to almost sub-arctic, serve to inure him to all kinds of extremes elsewhere, and he readily adapts himself to his surroundings. The open and communistic character of his daily life—indeed, privacy is almost unknown—tends to render him natural and to develop self-restraint, patience, and resourcefulness. On our expeditions my hunters were never idle, and even on off-days in camp they rarely rested. Nearly all their spare time was spent in fishing, making toys, and playing games, or occasionally writing notes of the journey or what not. They invariably showed great interest in my country, and, for men of little education, asked quite intelligent questions about it. Most of the headmen possess rough maps of their

district, and my companions readily understood the use of those I carried when explained to them. The headman, a sort of village mayor, is a useful factor in the organization of the country-side. Two years ago, when engaged in the work of distributing the relief sent by the foreign residents in Japan and China to alleviate the distress during the Aomori famine in northern Japan, I was brought into close contact with many of them. During the preliminary work of investigation, I found it possible almost at a moment's notice to obtain, through the headman of any given village, the minutest information of the circumstances of any given family. The social organization, so to speak, is most extraordinary all over the country, and the average Japanese possesses the most remarkable aptitude for the mastery of details. On every hand one is reminded that Western civilization has come to a people already possessing, to a high degree, those very capacities and faculties of assimilation that most enable them to adapt for their own purposes whatever they have adopted from the resources of Western peoples.

To what extent they will succeed, however, as *permanent* colonists on the mainland of Asia need not now be discussed. What is certain is that the new fields acquired by Japan on the mainland seem very favourable for the experiment. No less than seven-eighths of the area of Japan is mountain land, and of such a character as to practically preclude the permanent support of a rapidly increasing population. Korea, however, with its hills and forests, its mineral wealth and its fertile plains, has been, as yet, comparatively little exploited, and offers exactly the colonizing ground needed for the overflow of the swelling tide of Japanese life.

APPENDIX.

PLANTS FOUND BY THE REV. W. WESTON IN THE SOUTHERN JAPANESE ALPS.

On Kaigane.

Alsine Arctica (Fengl.).
Anaphalis Alpicola (Makino).
Anemone narcissiflora (L.).
Aquilegia Akitensis (Huth).
Diapensia Lapponica (L., var. *Asiatica*, Herd).
Draba Nipponica (Maxim).
Dryas octopetala (L.).
Geum dryadoides (Sieb. et Zucch.).
Lychnis stellarioides (Maxim).
Oxytropis Japonica (Maxim).
Pedicularis chamissonis (Stev., var. *Japonica*, Maxim).
Phyllodoce Pallasiana (Pall.).
Potentilla gelida (C. A. May).
Saxifraga bronchialis (L.).
S. cernua (L.).
Schizocodon soldanelloides (Sieb. et Zucch.).
Sedum rhodiola (DC., var. Tashoioi Fr. et Sav.).
Stellaria florida (Fisch, var. *angustifolia*, Maxim).

ON SENJOGADAKE.

Aquilegia Buergeriana (Sieb. et Zucch.).
Arabis amplexicaulis (Edgew.).
Astragalus frigidus (Bunge).
Campanula dasyantha (M. A. Bieb).
Clematis Alpina (Mill).
Cypripedium Macranthon (Swartz).
C. Yatabeanum (Makino).
Draba Nipponica (Makino).
Eritrychium pedunculare (A. DC.).
Euphrasia officinalis (L.).
Geranium eriostemon (Fisch).
G. Hakusanense (Matsumura).
Geum dryadoides (Sieb. et Zucch.).
Hypericum Senanense (Maxim).
Leontopodium Japonicum (Miq.).
Pedicularis Keiskei (Fr. et Sav.).
Polygonum viviparum (L.).
Ranunculusacris (L., var. *Stevnie*, Regel).
Rhododendron chrysanthum (Pall).
Saxifraga bronchialis (L.).
Schizocodon soldanelloides (Sieb. et Zucch.).
Sedum Senanense (Makino).
Thalictrum aquilegifolium (L.).
Thymus serpyllum (L., var. *vulgaris*, Benth).
Trautvetteria malmata (Fisch, var. *Japonica*, Huth).
Trientalis Europœa (L.).
Trollius patulus (Salisb. var.).
Vaccinium vitis-idœa (L.).
Viola biflora (L.).

ON KOMAGATAKE.*

6000–7000 feet.

Arabis lyrata, L.
Astilbe Thunbergii, Miq.
Cassiope lycopodioides, Don.
Cornus Canadensis, L.
Deschampsea plexuosa, Trin.
Geum Calthæfolium, Menz. (var. *dilatatum*, Torr. et Gr.).
Pedicularis Chamissonis, Stev.
Phyllodoce taxifolia, Salisb.
Pirus aucuparia, Gaertn. (var. *Japonica*, Maxim).
Polypodium Senanense, Maxim.
Rhododendron rhombeium, Miq.
Saxifraga cortusæfolia, S. et Z.
Schizocodon ilicifolius, Maxim.
Solidago Virga aurea, L.
Trientalis Europæa, L.
Tripetaleia bractata, Maxim.

8500–9500 feet.

Andromeda nana, Maxim.
Arctous Alpina, Niedz.
Arnica Alpina, Olin. (var. *A. angustifolia*, Vahl).
Diapensia lapponica, L.
Empetrum nigrum, L.

9500–10,000 feet.

Angelica multisecta, Maxim.
Carex montana, L. (var. *Oxyandra*, Fr. et Sav.).
Cerastum schizopetalum, Maxim.
Luzula campestris, DC. (var. *Multiflora Celanos*).
Pilea petiolaris, Bl.
P. pumila, A. Gr.
Pirus aucuparia, Gaertn. (var. *Japonica*, Maxim).
Potentilla gelida, L.
Saussurea Tanakæ, Fr. et Sav. (var. *phyllolepis*, Maxim).
Schizocodon Soldanelloides, L.
Sedum Rhodiola, DC. (var. *Tashiroi*, Fr. et Sav.).
Stellaria florida, Fisch (var. *angustifolia*, Maxim).
Viola biflora, L.
Vaccinium vitis-idæa, L.

Before the paper, the PRESIDENT said: There is no occasion for me to introduce to you the Rev. Walter Weston. Many of us remember how, eight years ago, we

* Some of these were supplied by my friend Mr. Takeda Hisayoshi.

heard him deliver an address on his travels in an out-of-the-way part of Japan. His address to-night will deal with another portion of the same country that he dealt with before, and I think, from the pleasure we had in hearing him in the past, we are assured of having great pleasure in hearing him to-night. I will now call upon him to deliver his address.

After the paper, Rev. H. W. L. O'Rorke: There is one part of the delightful tour which Mr. Noel Buxton and I took with Mr. Weston, of which I would speak, and that is of the descent of the Tenryugawa rapids. We approached over one of the most beautiful passes in the whole world, until we reached the Tenryugawa rapid at about two o'clock in the morning. We always worked for eighteen hours a day, and that is why I cannot tell you much: I had not time to write down anything. We started at six o'clock in the morning, and we had four hours' sleep. Those rocky gorges which have been described to us, but of which, unfortunately, we have seen no picture, convey to my mind the most beautiful of all river scenery that is to be seen in the world. I have been down the Rhine and the Danube, but the Tenryugawa is far finer than either. From the rocks above hang down wisteria, in all their glory of mauve and white, and the air is scented with their delicious perfume. The journey is one of considerable risk, though the boatmen are so careful in taking you down the rapids, and so thoroughly understand their business, that you do not realize your risk. The risk is owing to the trees which are being cut on the upper side of the gorge, and which are allowed to fall down into the river and float thence down to the sea. I think that of all countries in the world you can understand most of the character of the people from the geography of Japan. You have heard that seven-eighths of the country is mountainous. I did not know the proportion was so large; I thought seven-tenths; but if seven-eighths is mountainous, you can understand the hardihood and independence of the average Japanese. We have only to realize that with seven-eighths of mountainous country and one-eighth of plain, they support a population of forty millions. That means that every man must do an honest day's work, that every man must lead the simple life, and we cannot doubt what the fate of such a people as that will be in the history of the nations of the world.

Mr. J. H. Longford: I have very little right indeed to speak upon Mr. Weston's interesting paper, because I have scarcely any direct knowledge of the places which he so admirably described to you, with the exception of the district immediately surrounding the two picturesque rivers he has mentioned. But in an amateur way I have sufficient experience of mountain travelling in Japan to be able to form an estimate of the difficulties which Mr. Weston must have overcome in doing all he has done so successfully, and of the pluck, endurance, and determination which he must have shown to have reached the summits of those hitherto inaccessible mountains. A good many of you, no doubt, have experience of the Alps, and you perhaps consider you have had sufficient discomfort in your mountaineering experiences when you have had to sleep on straw in draughty chalets, and your slumbers were broken, when they seemed to have hardly begun, by the loud tinkling of the cattle-bells. But I can assure you that the worst physical discomforts of the lower Alps are as nothing compared with what one must undergo when mountaineering in Japan. You arrive at night weary, wet, and worn, and you have to crowd with coolies, hunters, and guides into a small hut without a window, and in the middle of which there will be a fire of green wood alight, with no opening for the smoke to escape. Your best food will be cold rice and bovril. And then, when you have overcome all, and you think you are going to be rewarded for your day's fatigue by sleep, you will be terribly disappointed. The Japanese are the most inveterate gossips in the world, and no fatigue seems to prevent them from

indulging in it. While you are trying to sleep they will keep up most incessant chatter till about twelve o'clock, and then quiet comes, but about two o'clock they wake up and begin again. One mountain that Mr. Weston has spoken of, Huzan the Phœnix peak, which he very justly said has never been trodden by human foot before, I have no personal knowledge of, but I happen to be in possession of an old illustrated native topographical work, which gives various pictures of it, and I assure you that Mr. Weston's illustrations, compared with those pictures, were modest in the extreme. The peak is shorter than that of the Matterhorn, but it is just as steep, and when you remember that the first ascent of the Matterhorn was made by a large party of experienced alpine climbers, several of whom unfortunately sacrificed their lives in their exploit, you can form an idea of Mr. Weston's pluck and mountaineering skill in venturing on and successfully accomplishing this difficult feat entirely alone and unaided. He made one slight slip in his paper. In speaking of Huzan, he mentioned Dainichi Nyorai, the Buddhist saint, as having attempted but failed in the ascent, but in doing so he made a slip. Dainichi Nyorai was one of the Buddhist Trinity, the personal perfection of wisdom and purity, but he was never in Japan at all. The Buddhist to whom Mr. Weston meant to refer was Kōbō Daïshï, who was one of the most celebrated persons in Japanese history. He not only was a patron of sculpture, an author, the founder of one of the greatest monasteries in Japan, and the inventor of the Hirakana, the syllabary, which the Japanese use to this day, but he was reported to have ascended every mountain-peak in Japan, with the exception of Huzan. I might say, whilst referring to the monastery which he erected, Koya San, it is one hardly ever visited by European travellers, as it lies a little out of the way; but it is one of the most wonderful sights in the world, and is situated in one of the most magnificent spots in Japan. If it should be the good fortune of any of you to visit Japan, I cannot too strongly recommend you not to omit it. Then Mr. Weston also referred to the Buddhist Korean priest Giogi Bosatsu, of whom it is reported that he constructed the canal which leads out of Lake Suwa and ends in the river Fujikawa. He is only one of the Buddhist Koreans who came over to Japan in the sixth century of our era and brought with him the Buddhist literature, and he was one of the first to expound its mysteries to the Japanese. He not only did that, but he taught them the art of making pottery, and there is still one well-known ware in Japan which bears his name, and is in everyday common use. Mr. Weston has spoken of Japan's mission in Korea. Well, it may be Japan's mission to introduce Western civilization; but if she does, she will only be repaying the debt which she incurred herself to Korea more than a thousand years ago, when she obtained from it all the elements of Chinese civilization, on which she lived until she was brought into contact with foreigners. She has not hitherto paid the debt; but we will all hope that a new era has dawned, and that a prospect is now opening of that wretched country, under the honest and enlightened administration which Japan will secure for it, becoming as prosperous even as Japan itself.

Dr. Vaughan Cornish, referring to Mr. Weston's journey to the extreme north of Japan, on which he obtained an exceedingly interesting photograph of the village buried in snow, gave some account of Mr. Weston's persistent and praiseworthy efforts on his return to obtain relief for the famine-stricken people in that region, efforts which were crowned with success, Mr. Weston himself, under the greatest difficulties, conveying the relief and distributing it to the grateful people.

The President: I will simply propose a hearty vote of thanks to Mr. Weston for his admirable paper. There is no occasion to say anything about it, because the way in which you received it is quite sufficient proof of its merits.

A JOURNEY TO THE LORIAN SWAMP, BRITISH EAST AFRICA.*

By Lieut.-Colonel W. H. BROUN.

It is necessary to obtain the sanction of the Commissioner of the Protectorate to pass the equator to the north and to travel to the east of Mount Kenia, for in this direction the natives are little known, and they are believed to be hostile. I was referred by the commissioner to the sub-commissioner of the Fort Hall district, on the understanding that if no objection was raised, the route to the east of Mount Kenia could be taken.

The caravan, or safari, as it is called in East Africa, consisted of thirty odd porters and a Swahili guide who had been to the Lorian swamp before. The porters were Swahili and Wanyamwezi: these men are the most suitable for long journeys. They carry more weight, 60 to 70 lbs., are more dependable than the other races, and they like the life. To carry the food of the porters there were eight donkeys. They feed themselves, and were indispensable in a country where food is renewable only at wide intervals. The load for a donkey is 120 lbs.

Fort Hall was left on June 12, 1904, and the first part of the journey was to the junction of the Thika and Tana rivers, some 32 miles below and south-east of Fort Hall, the path leading down the spurs from the Kikuyu hills, on the summit of one of which the Government station is located. On this section three streams are crossed which flow into the Tana to the east, and through one of them the animals were swum by a rope fastened to the neck, paid out on one bank and hauled in on the other side of the stream.

The next section of the journey, 140 miles, is from a point on the right bank of the Tana, 6 miles up-stream to the east, to the rapids of the Tana, north of Mabea, a Wakamba village. It was the most unpleasant portion of the journey, from scarcity of water. The first march leaves the Tana for the Kangondi hills, south-east across undulating and rising grass plains with many dry watercourses. Camp was close to a water-hole containing evil-smelling mud, which was cleaned out, and it was late in the day before water could be obtained. A hill on the Kangondi hills, 1½ mile off, bore 132°. The next march was over picturesque yellow grass expanses with acacias, and many ravines in the rough lava-flow on the surface. The road to Kitui branches off southwards an hour from camp, which was on the side of a north-and-south ravine with pools of clear water. Game was seen from the path—eland (*Oryx beisa*), hartebeeste, and zebra. A troop of two lions and three lionesses (my man said five) were hunting the same herd of game that I was, but they were wary and would not

* Map, p. 128.

allow an approach. The game was very shy, which I attributed to natives, and not to the lions. It is a remarkable fact, in my experience, that lions do not appear to scare game and make it difficult to stalk; hartebeeste and zebra will permit a gorged lion to pass close to them, quietly moving out of his way. I have seen zebra solemnly gazing at a lion 30 yards away eating one of their number.

The next two marches led out of these plains and among some hills to the east, to a village, Mewani, on one of the numerous spurs running north towards Mumoni. Mewani, 3959 feet (B.P.T.), on the head of a spur, is one of numerous Wakamba villages. There is a pleasing outlook over hills and abrupt valleys, the rocks are volcanic and gneiss,

EMBE OR JOMBENI MOUNTAINS FROM ROUTE, GOING NORTH AND PARALLEL TO THEM TO REACH GUASO NYIRO RIVER.

and the vegetation is fresh and green. The water-supply is precarious, and the people obtain it by digging in the ravines; for, like so much of Africa, the rain-water speedily runs off and evaporates. There is one noteworthy phenomenon observed here and on the Jombeni range, which accounts for the fertility of this place and others of like elevation, about 4000 feet, viz. the drenching dews, wet mists, and clouds which are condensed during the cool nights and suffice to keep the crops fresh and growing during the heat of the day. Tibui, the next camp, 7 miles to the north, is under the influence of the dews; but the next camp, 11 miles further north, is by aneroid 3100 feet, and here there is a desiccated thorn bush, no leaf-bearing trees, no villages, and the wet mists do not come down so low.

At Mumoni, camp was made up a hillside (3500 feet aneroid), to obtain water issuing from a spring. The two hills of Mumoni, the summits covered with green trees and bush, are a landmark seen from considerable distances, and about them are a number of Wakamba villages under the fertilizing water-vapours. Food was procurable in trifling quantities only, either from scarcity or indifference of the natives to sell. The Wakamba are a very numerous tribe and their country extensive. They are the most intelligent and industrious race in the protectorate. Their household utensils and personal ornaments have a finish and design superior to other tribes; their arms are bows and short swords. The next march was over the sand-bed of a dry watercourse, with villages bordering the way and hills on either hand to Okazi. Water was only obtainable by digging. The next march was to Millea, due east across a succession of steep volcanic ridges and ravines. A broken, arid, and wild track, the vegetation thorn scrub, cactus, and baobab trees. It was difficult for donkeys, and in several places they required assistance up and down steep and broken inclines. Prospectors of the East Africa Syndicate have been through this district, but no minerals were found. From Millea our camp was changed to Kimmangu, a village close by, to purchase food. The district is a dry one and probably subject to drought, the height 2500 feet aneroid.

From Kimmangu, a night march was made to Mabea due north. This march was made at night, because its length could not be ascertained definitely; the guide was unwilling to move. But the moon was full, and if the march proved a long one, it would be less trying for the men, and donkeys walk faster at night. At 7 p.m., with a rising moon, the march commenced, and at 11 p.m. the next camp, Mabea, was reached. Many Wakamba villages were passed, and from two of them men came out willingly to show the way. The path was open and free from difficulties, and the caravan moved quickly. There are many Wakamba villages round Mabea, which is 2750 feet (aneroid). It is a dry district, and the water is bad and obtained by digging. The physique of the people is inferior to that of the Wakamba previously met, and I saw a large number of men and women and children with indolent ulcers on the legs and person. But the better class among them, who drink milk I was told, were of superior physique and free from cutaneous affections. One old man appeared to have malignant disease of a knee-joint. These people seldom saw a white man. Before the camp was astir in the morning, many baskets of beans and flour were brought for the porters, and eggs and a fowl for myself. This portion of the country is entirely dependent on ample seasonal rains, scarcity and famine must ever menace the people, and their appearance denotes experience of privation. The attitude of these villagers was most confiding and friendly, and men, women, and

children came for medicine for their ailments, and were attended to. These are the last villages south of the Tana river, though patches of bush between here and the Tana are cleared and burnt, and prepared for cultivation in the rains. The next march was a long one without water, though exact information could not be extracted from any one. We marched at 2.30 p.m. the same day, and moving throughout the night, with a halt of three hours, the Tana river was reached at 6.30 the next morning; the donkeys coming in 45 minutes after; the porters, not till 9 a.m. The route was through a very dry, low hill country of dense thorn jungle. The loads on the donkeys were

TO EAST OF EMBE OR JOMBENI MOUNTAINS, SHOWING ROUGH VESICULAR LAVA SURFACE.

frequently overturned, and the bags torn, with loss of food; and the men had to stoop to avoid the thorns, which encroached on and nearly blocked the path in many places. It was a trying march for man and beast. Water was sent back from the river to stragglers. At 1 p.m. a move was made to cross the river. The main stream of these rapids, at this the dry season, is confined in a narrow, deep rock channel under the left bank, where it is too deep and strong to cross. Over the channel an ingenious interlacement of branches of trees has been placed by the Wakamba, who are traders and hunters in the countries to the north. The loads were handed across the bridge of boughs by men on either side and one in the centre. They were

then carried across two subsidiary streams by the men; these streams were not more than 2½ feet deep and some 25 yards broad. When everything had been placed on the farther bank, a favourable spot was located for swimming the donkeys. There was a formidable rush of water 35 yards broad, but the rope held, and they were speedily dealt with. Pushed in, they instantly disappeared under the swirl and eddy; but twenty men standing high above the water hauled quickly, and two men received each animal as it arrived and cast it loose. It was like having a big fish on. Had the rope broken, the animal would have been killed in the rapids below. It was a favoured opportunity for crossing a river which, after heavy rain, would have caused a delay till the water subsided, a delay of days probably. All pretence of official influence ceases south of the Tana. Camp was on the high left bank of the Tana (1800 feet aneroid).

The next section of the journey was from the Tana to Laiju or Zaichu, a village in the Jombeni range of mountains; or, as my guide called them, the Wa-embe mountains, after the name of the principal tribe living in them—distance 35 miles. Leaving the Tana July 2, a march of 5 miles was made on a path through thorn bush and trees to the Zangaza river, a clear stream 20 yards wide, 6 inches deep, which was crossed, and camp formed a few yards from the left bank, on an open space of grass surrounded by dum palms, mimosa, and green-leaf trees—a luxurious grove of shade after the dry, stark, thorn bush country passed through (altitude 1800 feet aneroid). The interpreter informed me that he had heard a lion "shouting" on the march. We halted to rest and feed the donkeys. This river was found to join the Tana 3½ miles to the east of camp. After crossing the Tana it is expedient to march in order, men and animals closed up, for a straggling party would be a temptation to the Wa-embe tribe who frequent the bush. They are reputed to be hostile to Europeans. The next camp was on the left bank of the Ula river, 10 miles, 2050 feet aneroid. The next on the Kura river, 2500 feet aneroid. Both these are clear mountain streams of cold water. After crossing the Tana, it was noticed that baobab trees, which were numerous and large south of that river, were not observed north of it. Lions down wind on the march smelt the donkeys and came up to investigate without showing themselves, though they were noisy. It is said that lions are silent until they have killed, but there are exceptions to that rule. From the Tana river the route is through small trees and thorn bush. At this camp there was foliage; it is close to the foothills.

Next morning Laiju was reached, about 7 to 8 miles, up through the foothills to the lower spurs of the Jombeni mountains, 3195 feet (B.P.T.). A good landmark for Laiju is a perfect crater or volcanic cone close by. Care is desirable in approaching this place; there are dense coverts on the track. The first natives suddenly met were

clearing the bush, and they ran at once for their shields and spears, which were stuck in the ground; but they were reassured by our quiet approach, and showed the way. On this march, in the coverts at the foot of the hill I saw a hartebeeste; the species could not be identified; it was the only one seen north of the Tana. A highly picturesque winding path led to Laiju; parts of it were completely embowered in creepers, forming shaded alleys. It was necessary to put in here to purchase food for the caravan. Laiju is within the influence of heavy dews and moisture-laden clouds at night; the soil is rich dark loam, and the coloured varieties of beans purchased were the finest samples

CRATER OF CHIOMBE, NORTHERN EXTREMITY OF JOMBENI RANGE.

seen in East Africa. The metama was particularly good; sweet potatoes, beans, and corn are grown in abundance.

When the extensive areas of mountains and valleys to the east of Mount Kenya are known, with their zones of varying altitude, temperature, and moisture, they will probably be found to be equal to the most fertile portions of the protectorate, and very worthy the attention of planters. The Jombeni range varies from a few hundred feet high to the north, where it ends in sterile slopes and isolated hills, to 7000 feet and probably more above and about Laiju. The existence of Wyzeri, headman of Laiju, and his people appears to be due to the sufferance of the Wa-embe, whose villages are on the encompassing mountains, and who could wipe him out at any time. Wyzeri said he was

glad a white man had come to his country; he had seen one before long ago, an American (Chanler?), who shot elephants. He expressed the hope that the Government would soon send white men to his country. "The Wa-embe were bad people, and killed his men and strangers." Full donkey-loads of beans and flour were purchased for small white beads and chain; an exchange of presents took place, and an amicable parting followed. The morning the caravan left Laiju not a native was seen; none of Wyzeri's people appeared to see us off. The explanation was that Wyzeri feared an attack upon us by the Wa-embe. Had it come off, by confining his men to their villages, all appearance of his being implicated would have been avoided. The next stage of the journey was from Laiju to the Guaso Nyiro river, some 70 miles.

Descending the foothills on July 9, a narrow belt of fine forest trees was passed through, and a route taken well away from, but parallel with, the continuation of the Jombeni mountains north-east, crossing lava ridges falling from the hills, and two clear mountain streams: camp was near the last, 2850 feet aneroid. Cultivation was noted on the slopes of the mountains. A good offing was given to the hills to discourage native enterprise. The next day seven other crystal-clear streams were crossed; one ran through a swamp, and one was seen to end in a swamp 200 yards to the east, and the same volcanic ridges. The guide cautioned me not to allow the donkeys to linger near these captivating streams, for there is a fly in the covert fringing them whose bite is fatal to donkeys; and so it is, as was proved later on. On the following day the route was over broad, flatter ridges, of vesicular volcanic rock, the lava-flow decreasing with the height and size of the mountains; yellow grass up to the knees (good fodder), scattered mimosa trees, raphœa palms, and dense greenery in the depressions containing the streams contributed to soften these wild tracts. Camp was at Mymboro, 2404 feet (B.P.T.), close to a spring and an isolated hill bearing 305°.

Thomson's and Grant's and Waller's gazelles, and water-buck, oryx beisa, eland, zebra, rhinoceros, lion, and I believe a few buffalo; ostriches, frankcolin, crested guinea-fowl, and lesser sand-grouse, are to be found north of the Tana and east of the Jombeni range. The next camp was waterless, and the men were prepared for it. At 1 p.m., July 12, we marched till sunset, and before sunrise next morning for two hours to obtain water, but there was none. After a long fruitless search the guide returned, and the march was continued till 6 p.m., when the donkeys were exhausted and the men spun out for miles behind. The donkeys were unloaded, a guard left, and with the few men who had come up, the donkeys, sheep, a goat and her kid, a thirsty party, we struck across very rough volcanic rocks in the dark to the crater of Mgambe (Chiombe) for water, which was reached at 9 p.m. There is water and slime on the floor of the crater. A water-party was

sent back to the men, which arrived as the last of the porters came up. In the morning one donkey and a sheep were found dead. Chiombe is at the northern extremity of the Jombeni range, and is a typical cup-shaped crater with a fissure in its brim on the east side, through which men and animals had tumbled the night before—altitude 2800 feet aneroid. Along the foot of the Jombeni range there are other craters more or less broken down. Near the water in the crater some bushes grow, and one of the donkeys was struck by a fly and rapidly swelled up along the belly, then the head and neck, and in forty-eight hours it was dead. To reach the Guaso Nyiro, a waterless plain of doubtful

CRATER OF CHIOMBE. THE BREACH ON THE EAST SIDE OF THE RIM OF THE CUP.

distance intervened. The guide said two marches. At 1.30 p.m., July 15, with a bearing of 345° on Donio Longelli, the caravan marched and camped before sunset. The route is over lava; in some places each step requires care, in others the rock is disintegrated into dust. There is a short dried grass, which the game eats close to the roots. Early on July 15 the Guaso Nyiro was reached, 2463 feet (B.P.T.). Donio Longelli bore 117° and about 1 mile. The river is some 25 to 30 yards wide and mud-coloured. The guide informed me that Mr. Tate, on his return from the Rendile country, had a camp a few yards away. From the crater of Chiombe to the Guaso Nyiro is not more than 14 miles, but not knowing that, the weak state of the donkeys required caution.

The next section of the journey was from this camp, following the Guaso Nyiro east by its right bank to the termination of the river in the Lorian swamp, 160 miles. In the narrative of Mr. Tate's journey to the Rendile country, *R.G.S. Journal*, February, 1904, the Lorian is said to be six marches east of this camp; my guide said sixteen. It was important to know how many days it was, because there was then only sixteen days' full rations for the porters. If it was sixteen days, it was sixteen days more to return to this camp, and eight days west from this camp to Mzara—*i.e.* forty days before any more food could be bought. It was decided to march four days down the river, and question the guide again. Having done so, he said it was twelve days more to the Lorian swamp. Full rations for twelve days then remained. The porters, when told of the state of affairs, said at once they were very willing to go on. They wanted meat, "only let it be large." Just before reaching this camp, the fourth down stream and some 42 miles, the lava-flow, which from the Tana everywhere forms the surface rock, ceases abruptly at a perpendicular basalt bluff 15 feet high on the side of a ravine, issuing on the river. From this spot, indicated on the map, to the Lorian swamp is about 100 miles. The surface of the country bordering the river is a calcareous loam, which in some places is no doubt alluvial, and the river flows quietly on about 2 miles an hour, very gradually and consistently falling from 1700 feet aneroid at this fourth camp to 908 feet (B.P.T.) close to the Lorian swamp—*i.e.* a fall of 792 feet in 100 miles, or 1 in 666. From the first camp on the river, 2463 feet (B.P.T.), to the fourth camp, 1700 feet aneroid, the fall is 763 feet in 42 miles, or 1 in 290. All the rapids and falls occur in the course of the river above the ravine noted, where it has been affected by the stupendous outpourings of lava which appear on both banks. The route to the Lorian below this ravine is easy, and the river is extremely picturesque, groves of dum palms and flat-topped mimosa affording pleasant shade for camps. The going is sound, the bush in stretches is sometimes dense, and rhinoceros harbour in it, but only once in my absence did one succeed in thick covert in rushing the caravan and overturning the donkeys. The few occasions when rhinoceros took the initiative were promptly dealt with, a Lancaster cordite rifle never failing to kill when it was necessary for the safety of the caravan; its power and accuracy were unrivalled. A most important detail on a journey of this kind is that the men should have confidence their protection is attended to. At the seventh camp down the river, at midnight a lion suddenly sprang into the camp and seized a man by the arm, but he only secured a blanket and made off with it. After crossing the Tana river, six porters were detailed for guard every night, each man for two hours, and the immunity from injury and loss of life is partly, at least, attributable to this precaution. The men demurred at first to the innovation, but later on they undertook the

GUASO NYIRO, EIGHT MARCHES FROM LORIAN, SHOWING A SPECIES OF WILLOW TREE.

GUASO NYIRO. CHARACTERISTIC REACH ON THE RIVER, SHOWING GROVES OF DUM PALMS FRINGING THE BANKS, SOME SEVEN MARCHES FROM THE LORIAN.

duty willingly. At camp 8 down the river an outpost of young warriors of the Samburu tribe was met. They appeared to be doubtful of their reception, but were soon reassured, and accompanied me to the main encampment of these people three marches down the river.

The Samburu at one time belonged to the Masai nation near Naivasha, but as the result of inter-tribal strife their ancestors migrated, and this section of them is located on the right bank of the Guaso Nyiro, up and down which they move to pasture their stock—viz. cattle, sheep, goats, donkeys, and a few camels. They are purely pastoral, and live exclusively on meat and milk. In appearance and bearing and arms and customs they resemble the Masai, and speak that language, modified perhaps by intercourse and intermarriage with the Rendile, who, they said, are their friends, and who wander over the country on the left bank of the Guaso Nyiro and to the north. Their headmen reported that they had recently been raided by the Wakamba from British territory, and were anxious to know if this had taken place with the approval of the British Government, for, they said, "we are the friends of the white man." They expressed fear, also, of being raided by the Masai. They were pacified on both heads, and it is to be hoped, for the credit of our reputation, that another outlet for the energies of the Wakamba may be found. An exchange of presents took place, and they said the Lorian swamp was four marches down-stream; and so it was. But as the guide was not sure of the route, and the river has cut a canal-like channel through the alluvial soil nearly three marches from the swamp, and there is little indication of its course a few yards away from it, it was necessary to keep close to the stream, which winds much, and so it was not till the morning of the fifth day, August 2, that camp was pitched on the river some two hours from its disappearance in the reed bed of the swamp, where the river is not more than 10 paces wide and 2 feet deep. The swamp was only half an hour's walk, on a bearing of 145° down a gentle incline; and even then, unless I had been told that a dark line was a reed bed, I should not have known the swamp was certainly there. The altitude of this camp was 908 feet (B.P.T.) and 900 feet aneroid; and allowing 28 feet for the decline, the swamp is 880 feet above the sea. From the first camp close to Donio Longelli it had taken sixteen days to reach the Lorian, and the distance 160 miles. On August 2 and 3 the swamp was examined. Most unfortunately, the small quantity of food left for my porters did not justify a longer stay, and, much to my regret, restrained me from walking round the swamp. What was seen is an immense bed of reeds 12 feet high, and *no open water*. It extended east and south, and a line of low hills bounds it in that direction. My guide said he had walked round the swamp on two occasions, and it was a two days' journey. It is therefore probably 60 miles in circumference, and to the eye that is a conservative estimate.

He was clear that *no water flowed out of the swamp from any point on its circumference.* He was questioned closely on that point. The Guaso Nyiro, on entering the swamp, sends off branches on either side, the larger ones to the south-east; these branches divide and irrigate the surface to a depth of 3 or 4 inches. There are dry areas also, but the footprints of hippopotami and elephants on them were half filled with water, denoting a water-logged state of the surface. The swamp was entered by a hippopotamus track, walking at the side of it and on the bases of the reeds; at each step many mosquitoes were roused. In a large branch of the river there was a party of hippopotami, which

SAMBURU, ELMORAN (WARRIORS). AN OUTPOST ON THE GUASO NYIRO.

allowed a photograph to be taken at eight paces. Buffaloes were heard, and there was fresh spoor of elephants, but none were seen. The plain surrounding the swamp had a very desolate appearance to the horizon, a low scrub only dotted here and there. The surface sloped down to the eastward, and in that direction a few zebra and ostriches were seen. Between the camp and the swamp was a large herd of Grant's gazelle and a few water-buck. The scarcity of game in sight was surprising, and it was extremely shy. In the rain season, when the water discharged by the Guaso Nyiro over the swamp must be very largely increased, any extension in the area of the swamp must be to the east, for on the south the range of hills forms a dam in that direction, and the slope of the ground on the west would prevent any

appreciable extension of it that way. The general slope of the country, as I have said, is to the east.

Fourteen miles west of the Lorian swamp, on the right bank of the Guaso Nyiro, there is an extensive shallow depression, with two or three channels meandering across it, covered with coarse yellow grass 3 to 4 feet high, and enclosed by dense tree jungle. When the caravan crossed it, going and returning, the surface was hard and cracked, but it was obviously in the rains under water. The altitude by B.P.T. on the river margin of this depression is 1008 feet, *i.e.* it is 100 feet above the Lorian swamp. This area is also called by the natives Lorian, and in the rains would undoubtedly be a shallow lake nearly 20 miles in length from west to east, and 3 to 4 miles broad. It may be this place, therefore, which has given rise to the report that there is open water at the Lorian.

I saw a herd of about one hundred buffaloes on this depression, and going to the Lorian swamp a white doe water-buck, among a number of common water-buck (*Ellipsiprimnus*). On my return, and at the same place, I saw a white doe, and a white buck with her. They were alone. The buck was shot, the doe unmolested. The buck was a mature animal, perfectly white, with dark muzzle and feet, and eyes of normal colour.

March 6 up-stream was parallel to the Erimba plateau on the left bank, an elevation of some 20 miles in length, its long axis east and west, and its height 300 feet. Camp 12 was a few yards below a remarkable fall 60 to 70 feet high. Below the fall the stream passes through a gorge, the sides rising sheer for about 60 to 70 feet, on the right being white trachyte, on the left a dark basaltic rock. The river (low water) fell over a ledge of basalt, through narrow water-worn channels close to both banks, leaving the polished ledge of basalt in the centre dry; the extension of this polished ledge up-stream forms the bed of the river. This is probably the fall known as Chanler's. The general level of the surrounding surface above and below the fall is preserved, and out of hearing of the falling water there is no indication of its presence, which explains why it was not seen going down the river. On August 16 the first camp was reached, *i.e.* in thirteen marches from the Lorian, and the distance 140 miles (instead of 160 going down), a more direct course being preserved when returning from the Lorian.

The next stage of the journey was to Mzara, seven marches, on the west of the Jombeni range, and north-west of Laiju, 76 miles. This was the nearest food-supply. On August 17 the route was continued for four days up-stream on the right bank, gradually rising, the last $4\frac{1}{2}$ miles of the fourth march being on a bearing of 121° away from the river, and parallel with a small mountain stream coming from Mzara. The altitude at this camp was 3213 feet B.P.T. This stream does not join the Guaso Nyiro, but disappears. In three more marches Mzara

was reached on August 23, the route continuing in proximity to the stream for water. On all sides a great plain extends to the mountains, rising gradually in terraces, the terminations of waves of volcanic flows from the highlands to the south. There are also undulations or broad ridges running from south to north. Dry yellow grass one foot in height and scattered flat-topped mimosa trees form a picturesque prospect. In the early morning the summit of Kenia stands out sharply, a fine sight.

Mzara altitude (mean of three observations, B.P.T.), 4456 feet.
" (mean of two observations, Watkin's aneroid), 4450 feet.
" (one observation, aneroid), 4400 feet.

GUASO NYIRO. TWO HOURS' WALK FROM ITS TERMINATION IN THE LORIAN SWAMP.

Ndominuki is the headman of this place, and is on friendly terms with the Wa-embe tribe, whose country marches with his. He is also friend of Mr. Neumann, an ivory trader in the district. He proved a somewhat inhospitable individual, but a supply of food was purchased for the men. They had been thirty-six days on quarter rations of grain, but fortunately a sufficient quantity of meat had been provided.

The next stage of the journey was from Mzara to Nyeri, with a diversion to the north to the Guaso Nyiro, and another on to the north-west slopes of Mount Kenya, to the lower limit of the forest belt, 7675 feet, B.P.T., some 200 miles. In one long march the plain to the north of Mount Kenya was crossed, direction west, to a stream 4920 feet aneroid, about 3 miles from the steep face of a plateau

400 feet high. Very strong winds from the mountains were experienced daily on these plains, and also on the Guaso Nyiro. On this plain Oryx beisa were very numerous, and hartebeeste were not seen. Should a sextant be used for observations, a protected artificial horizon is essential. The climate on the north of Kenya is exceeding dry, the nights cold, the days hot. It is agreeable in the early morning and after 4 p.m., and resembles the Punjaub in the cold season. On the north-west side of Mount Kenya there are extensive rolling downs of grass at altitudes of from 5000 to 7500 feet. It has the appearance of being an ideal country for great game—extensive coverts, ample water, and abundant grass; but the game is gone, harried and slaughtered by the remorseless Wandorobo hunters.

Nyeri, an official station, was reached on September 18. From thence direct to Naivasha on the Uganda railway is four marches. My caravan proceeded by a more circuitous path, crossing the Kikuyu mountains north-west of Nyeri, the highest camp 10,239 feet (B.P.T.), and afterwards the Aberdare range.

The juniper trees on the Kikuyu mountains are particularly fine; one measured at arm's length from the ground 16 feet in circumference, and others seen were much larger. Various heaths, one very like heather, flourished exceedingly. Everlastings, daisy-like plants, docks, wild strawberry, nettles, brambles, a yellow flower in the grass resembling aconite, and various thick-leaved shrubs with fragrant odours were also noticed. The scenery is magnificent, a maze of heights, forest-clad with bamboos, juniper, and a tree with the outline of an oak, its branches gnarled and contorted, but the leaves resembling an ash, six on each side and one at the apex. These fastnesses were the domain of the elephant in past times, and would be so again if he was protected. But from the numbers of elephant pits passed with the rotting remains of elephants in some of them, it is evident that the Wakikuyu are engaged in the nefarious and illicit pastime of killing this noble beast under the protection of our administration, for previously the dread of the Masai kept the Wakikuyu to their own cultivated areas on the south of the range. These remarks refer to the Kikuyu mountains, and not more than four marches from Naivasha.

This, the final stage of the journey, occupied with halts thirteen days, the distance traversed 91 miles. The last two marches were over the plateau, between the Aberdare mountains and Naivasha. On this plateau there were numerous villages, flocks, and herds of the Masai. Part of these pastures are included in the 500 square miles grant to the East Africa Syndicate, and since passing that way the Masai have been removed to another portion of the country to make way for the new owners.

As a matter of interest, perhaps, for a later date, attention may be directed to the last 100 miles of the Guaso Nyiro river commencing

at the ravine on the right bank where the surface volcanic sheet ends abruptly (from camp 1 close to Donio Longelli, 40 to 41 miles east, *i.e.* down-stream). This is a spot which cannot be mistaken or overlooked. Thence to the Lorian swamp is 100 miles, and the fall noted was 1 in 666. The stream flows quietly at about 2 miles an hour; there are no rapids, and the banks vary in height from 4 to 12 feet: the latter is unusual. Any one travelling on the right side of the river will observe the very large areas which could with ease and comparatively small outlay be brought under cultivation by irrigation works. It strikes one forcibly that no river could well be better adapted for irrigation

LORIAN SWAMP AND HIPPOPOTAMI IN THE MAIN STREAM OF THE GUASO NYIRO, INSIDE THE SWAMP. A SMALL AREA OF DRY GROUND.

purposes, for control, and the water even in the dry season contains much earth in suspension; i flood it would be greatly augmented. The climate is dry between the rain periods, the nights cool even at the Lorian swamp, the sun very powerful during the day, though a higher temperature than 93° in the shade was not observed. The paramount importance of water in Africa is fully appreciated in Africa—little can be done without it; its presence under conditions favourable for use should attract examination ere long. The natural outlet for this district would be across a waterless level expansion of some 50 to 60 miles, probably, to the Tana river and the coast. The Tana river has this year been accurately surveyed by a party of gentlemen, with the object of initiating steam transport, and of taking up land.

NOTES ON THE HISTORY OF THE NILE AND ITS VALLEY.*

By W. F. HUME, D.Sc. (Lond.), A.R.S.M., F.R.G.S.

The river of Egypt, spreading its beneficent influence in regions where barren desolation otherwise holds sway, has throughout human history had a strange fascination for both statesman and student. By warlike expedition or peaceful exploration, the mystery of its origin has been unravelled, and to-day its great feeders, the White and Blue Niles, and the Atbara, have been traced into the heart of the fastnesses where they have their source.

Contrast between the White and Blue Nile Systems.

At the outset a contrast of a striking character is apparent when the two main river-systems are compared, for the upper Nile, or Bahr-el-Gebel, passes without any marked break from the condition of tumultuous youth to one simulating all the characters of fluviatile old age. From north of Dufile (about 5° 45′ N.) it sweeps through a narrow ravine, rapid succeeding rapid, then suddenly emerges into the plain tract at Gondokoro, anastomosing channels, ox-bow lakes, and the intricate meanders of the sluggish stream all bearing witness to its apparently senile condition. But once again, where the Bahr-el-Ghazal and Sobat join, its character changes, the river regains something of its earlier vigour, and, already many a league south of Khartum, flows northward; it is often over a kilometre in width, bounded by low banks, and studded in places by lines of graceful acacia. Lake and meander have disappeared, replaced in the early spring by innumerable sand-banks, where assemble heron and ibis, pelican and Nile goose, lending animation to the otherwise monotonous and silent scene.

If we consider the mountain tract of a river as the region of maximum erosion and backward growth, its valley tract is that of transportation, such erosion as there is being mainly vertically downward, while the plain tract is the region of deposition and lateral erosion; then the Blue Nile may be said to have no plain tract in any part of its course. From the cataracts of Rosaires to Omdurman during flood it is but the transporting agent for the erosion products of the Abyssinian hills, the banks which border it on either side showing but little evidence of erosion by the turbulent flood-waters. It may therefore be regarded as at the valley stage of its existence in its lower reaches.

In the following remarks it is proposed to deal with those river

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problems of which the writer has had personal experience, and to offer answers to some of the questions which force themselves upon our attention.

The Great Plains of the Sudan.

Standing on the summit of Gebel Auli, a low elevation dominating the river some 25 kilometres south of Khartum, the observer sees spread at his feet one huge plain extending between the White and Blue Niles, while only far to the west in Kordofan rise isolated hills, relics of a once existent plateau. Standing and gazing over this expanse, which is studded with circular arrak bush or groves of acacia, the question forcibly presented itself, How did it originate? Was it the bed of a great lake, or the result of an action still proceeding? The traveller in the deserts of Egypt, and especially one traversing the vast waste which spreads westward to the uttermost confines of Africa, will have no difficulty in recognizing that this apparently boundless plain owes its existence to the hardness of an underlying rock-stratum. This factor, too, has determined the plateau summits of the limestone hills which form the eastern sentinels of the Nile valley in Northern Egypt, but in the expanse extending at our feet, and in the low cliff which borders the slow-flowing river, there is no evidence of an unyielding rock surface, against whose solid foundation the atmospheric agencies have struggled in vain.

But Egypt has another type of plain of very different nature and origin which arrests the attention of every visitor, and is in strong contrast to the sand-swept desert wastes. This is the famous Delta, in whose fertile fields we recognize the final resting-place of the rich soil borne by the silt-laden waters of the Nile from its far distant home in the volcanic hills of the Abyssinian plateau. Not denudation, but deposition, has played its part in the development of this land, which throughout all history has been a scene of agricultural industry and a source of wealth to successive empires. Is it, then, to deposition by rivers that we must look for the solution of our problem, the origin of the Sudan plains? The best answer I have yet received was given me by Captain Lyons, who called my attention to a most interesting memoir by Willard J. Johnson, on "The High Plains (of Western America) and their Utilization," in the Twenty-first Annual Report, 1899–1900, United States Geological Survey, Part iv., Hydrography, whose main conclusions were, in his opinion, applicable to the problem, so far as the Eastern Sudan plains are concerned.

These are as follows: One of the characteristics of desert mountains is a far-spread foot-slope, composed of their own waste products. The great plains of America, which in their vast dimensions resemble those of the Sudan, are in a sense such a slope, the mountain *débris* overlying the bed-rock to a thickness of over 200 metres, whilst their present

surface grade is not that of the original tilting. The whole structure has been formed in a series of stages. In the first stage, the mountain streams, traversing the plains, cut into their smooth structural slope and produce a topography of parallel broad valleys and ridges. In the second, ceasing to cut, they deposit instead, refilling the valleys they had excavated, and even burying the intervening ridges, resulting in the formation of a smooth upper surface. The original surface was a product of deformation, the second resulted from a destructive process of stream-erosion, the third is a product of stream deposit and construction.

In humid lands, the ground being saturated, the water is carried off along definite channels, and a river-bed, once formed, continues to be eroded until it reaches its base-level, as a rule that of the sea into which it enters. In a sub-arid zone, such as the Northern Sudan, the Abyssinian mountain region is relatively a humid tract, from which the streams run strong, carrying the materials of their erosion with them. As they issue into the desert properly so called, the greater number, receiving no supplies, dwindle and are absorbed; the larger part of their load, being deposited, builds up the desert surface, instead of being distributed at the bottom of the sea. At the mouth of each valley an alluvial fan of these materials is formed, and by the union of many such the plain surface is produced. The river Gash, near Kassala, which only flows for about eighty days in the year, is an admirable example of such a deltaic stream, and Mr. Dupuis, in his "Note on the River Gash," appended to Sir W. Garstin's Report,* clearly illustrates the close connection between the silt-laden torrent and the alluvial plain in which it is lost. Of the Atbara he says, "Next to its torrential character, perhaps the most marked characteristic of the Atbara is the way in which it persistently flows in a narrow valley or trench of great depth, which it has cut in the plain through which its course lies. This plain was no doubt originally formed by the river itself from the wash-down of the Abyssinian mountains, but owing to some change of conditions, possibly the gradual wearing down of the rocky barriers forming the cataracts of the Nile, the bed of the Atbara has for a long time past been gradually lowering itself into a channel of its own making, through the old alluvium, and in places into the rock below, and it now lies, almost throughout its course, in a narrow deep valley, with an eroding section, fringed by a belt of extremely rough raviny ground, rising gradually to the plain level on either side.

The great plains in the Eastern Sudan desert region may thus be the result of the gradual wearing back of the Abyssinian plateau, the deposits of whose rivers have been laid down on the evaporation of the

* 'Report on the Basin of the Upper Nile.' Cairo: 1904.

soil-bearing waters. Borings alone would reveal how far this explanation holds good for the plains south of Khartum.

While admitting that river action has in the main been the originator of the great eastern plains, the former existence of lakes is suggested by the vast quantities of impure limestone ("kunkar") present in the banks of the Blue Nile above Khartum. These are of some economic importance, as they supply the lime used in that city. An older formation was also observed underlying the modern alluvium at the village of Tura, 50 miles north of Duem, on the east bank of the White Nile, this consisting of a grey, sandy clay containing quartz pebbles and numerous very fragmentary remains, which Dr. Smith Woodward, F.R.S., has recognized as belonging to a siluroid fish and to *Polypterus*, both at present living in the Nile. Associated with these was the broken canine tooth of an extinct giraffoid animal related to *Samotherium* and *Sivatherium*.*

The time has not yet come for the solution of this portion of the Nile problem, but it is well that the facts obtained should be recorded for the purpose of discussion.

Ponding back by Streams in Floods.

The importance of this factor in geography has been emphasized by the recent studies on the basin of the White Nile (See Sir W. Garstin, *loc. cit.*, pp. 161–167).† Nothing, indeed, can be more remarkable than the contrast between the Blue and White Niles at times of flood. The Blue Nile, descending from the Abyssinian hills as a red-brown eddying surging torrent, sweeps across from the point at Khartum to the opposite bank at Omdurman, cutting off the light yellow-green waters of the White Nile, which break in gentle wavelets against the rushing stream as though it were a solid bank. At their junction long rows of pelicans, idly floating on the surface of a placid lake, seize the fish as they swim by, and the White Nile is pressed against the western shore, becoming a long thin wedge, which soon disappears, the only contribution of the White Nile to the flood-stream being portions of its lighter waters which are torn off and carried away by its swifter neighbour.

The same contrast was clearly illustrated by the discharge observations recently carried out. In the Blue Nile above Khartum, all was excitement and movement, the current meter making over one hundred and fifty revolutions a minute, every precaution also having to be taken to prevent disaster to the valuable instruments. So swift is the current

* See Cadell, "Development of the Nile Valley," etc., *Scot. Geogr. Mag.*, May, 1905, pp. 225–248.

† Also in "Some Problems of the Upper Nile," *Nineteenth Century*, September, 1905, pp. 345–367.

that the great stern-wheel gunboats passing upward to Wad Medani scarce made headway against the mass of waters. The White Nile, however, presented a complete contrast, for as the minutes sped by, the counter of the current-meter remained silent, and not a ripple disturbed the mile-wide surface.*

Gradually, as the flood-waters subside, the lighter waters of the White Nile contribute an increasing share to the volume of the combined stream, until during the early summer the conditions are almost completely reversed.

This ponding back of one stream by another in flood is no isolated case in the Nile valley, for Sir W. Garstin remarks (p. 162), "There can be little doubt that the waters of the Sobat, when in flood, hold back those of the White Nile, for a long distance upstream of the junction," the discharge data supporting this statement being then given. Similarly, he remarks on p. 168 with regard to the Atbara, "It seems probable that the Atbara water, when in full flood, holds back that of the Nile to a certain extent, as, during this period, the volume of the former river forces that of the latter across to the western shore. Without permanent gauges, and a series of discharges above and below, it is impossible to verify this supposition."

From Omdurman, where the Blue Nile and White Nile meet, the united rivers sweep on, past the broad sandstone plains and sandstone hills where Dervish power fell, past palm-groves and fields once green, now overgrown with poisonous Sodom apple (*Calotropis procera*), sad relics of the devastation when the Jaalin tribe was swept away by Dervish raid and ravage; but already a new condition of things is foreshadowed, where a felsite ridge extending across the Nile leaves a ravine 200 metres broad, through which the river flows in one steady and rapid stream, forming the Shabluka, or sixth cataract.

The Cataracts.

North of Berber, the river commences in earnest that period of troubled existence which is only terminated at Wady Halfa or distant Aswan. How did these cataracts originate? Why thus, in the very midst of its seaward journey, should the Nile again become a mountain torrent, with difficulty recognizable as the same grand stream which sweeps past Omdurman? One fact stands out pre-eminent—it is the geological structure of the country which has determined the position, the extent, and the nature of these barriers. It may be recalled that

* The maximum mean velocity of the Blue Nile as recorded on August 21, 1903, was 2·796 metres a second, or over 6 miles an hour, but the surface velocity would probably be nearly double this figure. In a recent paper by Captain H. G. Lyons in *Geog. Jour.*, September, 1905, pp. 259–262, full details of these observations have been published.

from Aswan to at least as far as Khartum, the desert on both sides of the river is fundamentally composed of the Desert, or so-called Nubian sandstone, overlying igneous and metamorphic rocks of totally different structure and composition, granites and gneisses (as at Aswan), or the intense black and deep green dolerites, slates, and schists, as at Wady Halfa. Had these beds preserved the normal dip to the north-west, the river should have passed from these older cataract-forming rocks to the sandstone, and the upper reaches should have been the scene of confusion, while further north the stream should have rolled its placid course to the sea. This, however, is not so. Whether as parts of the old continental floor, or due to gentle folding, the older series from time to time reaches the surface, and the Nubian sandstone outcrop is bent back away from the river. Immediately, nay, abruptly, the scene changes with the rock-change. Standing on the old tomb of Abu Fatma, near Kerma, north of Dongola, two different pictures meet the eye. Gazing over the sandstone area desertward, all is flat plain, studded with stunted thornbush, and in the river palm-groves rise on Baidia island, and a hundred saqias* sound forth their monotonous music. But look northward, and the sandstone plain is giving place to rolling hummock and ridge of gneiss and granite, while at your feet, but a few metres north of the junction of the two different rocks, the water is pouring over a rock bar, the first rapid of the Hannek or third cataract, and beyond is maze of island and channel, where the sound of the turmoil is never still. But why should there be a cataract even here? One of the answers is to be found in the fact that the rocks are not homogeneous; the gneiss, which here is the fundamental member, has been traversed by striking bands of granite extending far into the desert east and west, where they cross the river, narrowing it, and obliging it to pass through the few openings in the hard granite where it has been able to force a passage, so that each rapid consists of a series of islands in a straight line separated by channels of turbulent waters. Shooting the principal cataract in the spring, but little space is left between the rock walls, and the slightest mistake of navigation would mean certain destruction. Leaving the definition of the varieties of hard rock which have played this part in the history of the Nile, it is yet necessary to emphasize that one method of cataract origin is having a band of hard rock traversing the river-bed, this being at the third cataract in the main hard granite rising through softer gneiss.

The Kaibar, which for the greater part of the year is an absolute barrier to all Nile navigation, owes its origin to a similar cause, but with this difference—the hard band is gneiss, the softer sandstone otherwise surrounding it on all sides.

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* Egyptian water-wheel.

But the presence of rock-barriers is not the only source of origin of rapids in the Nile valley. The finest cataract near Wady Halfa is the Bab-el-Kebir, which, during the flood season, is a foaming mass of water restricted to a narrow channel, whereas in winter it is an almost dry ravine filled with boulders. Here the walls are composed of one of the hardest of rocks, whose original erosion seemed difficult to imagine, till further search showed that down the centre of the gorge ran a thin dyke of a softer rock, a porphyrite, by whose erosion the original direction of the rapid had been determined. This second method of origin may be further illustrated by the remarkable conditions revealed during the cutting of the Aswan dam, where it was shown that many of the cataract channels were due to the presence of a soft schist intercalated between the bands of granite rising through it, and the unusual sight could be observed of the soft rock-masses being dug out with spades. *Some of the important Nile cataracts, therefore, have originated at points where soft bands traverse the hard ones in the direction of the stream.*

There is also a third method of origin. Earth-movements often give rise to fractures or faults, and these also occur in some of the cataract areas, one being well displayed near the Aswan dam, where in the cemetery valley one side of the ravine is composed of granite and the other of sandstone, which normally overlies the granite. There seems little doubt that the transverse channel of the Bal-el-Kebir at Aswan was formed along the continuation of this line of weakness.*

It is here suggested, therefore, that the cataract-formation in the Nile is due to one or all of the following elements, it being a primary condition that igneous or metamorphic rocks are essential to their formation:—

1. Hard bands in soft rocks, traversing the river at right or acute angles.
2. Soft bands in hard rock, running parallel to the river's direction.
3. Lines of fracture producing a plane of weakening between hard rocks.

The formation of the Nile cataracts, therefore, illustrates in its widest sense the elementary principle that where rocks are homogeneous, cataracts *are absent;* where rocks are not homogeneous, rapids and cataracts *will undoubtedly be present.*

North of Aswan the scene again changes. Though the Nubian sandstone frowns in massive cliffs above the Nile at Silsila, yet there are no cataracts; faults on a large scale have torn the rocks asunder in the

* The importance of faults in the formation of the Aswan cataract has been recently urged by M. Fourtau in a paper read before the Cairo Geographical Society. These fractures had previously been studied by Dr. Ball, and the details will appear in the Geological Survey report on the first cataract.

desert near Qena, but on the river itself these movements have had no visible effect. It flows on more and more markedly between cliffs, first of sandstone, and then of limestone, until south of Luxor it passes from a probable valley of erosion to the proved portion of the Nile fault depression.

In conclusion, the probable geological history of this portion of the country may be briefly restated. During the Eocene period the sea apparently spread over the whole of North Africa; then step by step shallowed, till finally it was replaced by the Upper Eocene continent, where flourished those great mammalia whose remains to-day form one of the most valued possessions of the Cairo Geological Museum. Again, in Miocene times, the Mediterranean advanced northward to Vienna, absorbing the Black Sea and Caspian, southward covering the desert between Cairo and Suez, and extending some distance south along the line of the present Gulf of Suez. Then came a period of gigantic disturbance of the Earth's surface. Owing to great earth-foldings, the Alps and Himalayas as we now know them were called into existence, and in Egypt these movements were reflected by fractures and rifts which have left indelible and fundamental marks on the structure of the country.

It has now been proved that the sea advanced up the Nile valley at least as far as Minia, subsequently receding gradually, lake succeeding sea, and river succeeding lake. On the period of disturbance followed one where glacial conditions reigned over Northern Europe, this being represented in Egypt by the Pluvial or Rain period of Prof. Hull, when Red Sea Hill rocks were rolled down by torrents, forming the gravel beds of Wadi Qena and Dendera, while the Nile stream itself was sufficiently strong to carry these far north, so that in the gravel deposits underlying the Nile valley alluvium boulders of flint and limestone over 4 inches in diameter are frequently met with, as, for example, in the borings made for the Cairo water-supply.

To these gravels succeed sands, which have been noted in every boring yet made in the Nile valley; and, finally the Nile mud, which in the aggregate seldom exceeds 8 metres in thickness.

Thus the Nile, as we now know it, is both the product of mighty disturbances and of peaceful erosion. Its mud-laden flood waters are the witnesses of storm and stress in the Abyssinian highlands, its summer stream a memory of the lakes of Uganda, and the delta spreading mile-wide as one vast sea of cultivation, the record of a hard-fought fight between great rivals where sea and river meet.

CANAL IRRIGATION IN THE PUNJAB.

By Captain C. H. BUCK, I.A., Punjab Commission.

FEW people in England have any idea of the vast irrigation systems of India, and I propose in the following lines to place before the British public a brief description of the canals and areas irrigated by them in the Punjab. In order to understand the system, it is necessary to have a slight acquaintance with the geography of that province, and a glance at the rough map will show how the land lies.

The Punjab (*pănj* = five, *áb* = waters), as every one knows, derives its name from the five large rivers, Jehlam, Chenáb, Rávi, Beas, and Sutlej, which find their way across it from north-east to south-west. On its western boundary rushes the Indus, while on its eastern side flows the Jumna; the Himalayan mountains lie along the north-eastern side and form its watershed, while in the northernmost corner is a tract of high hilly land divided from the plains by the Salt range.

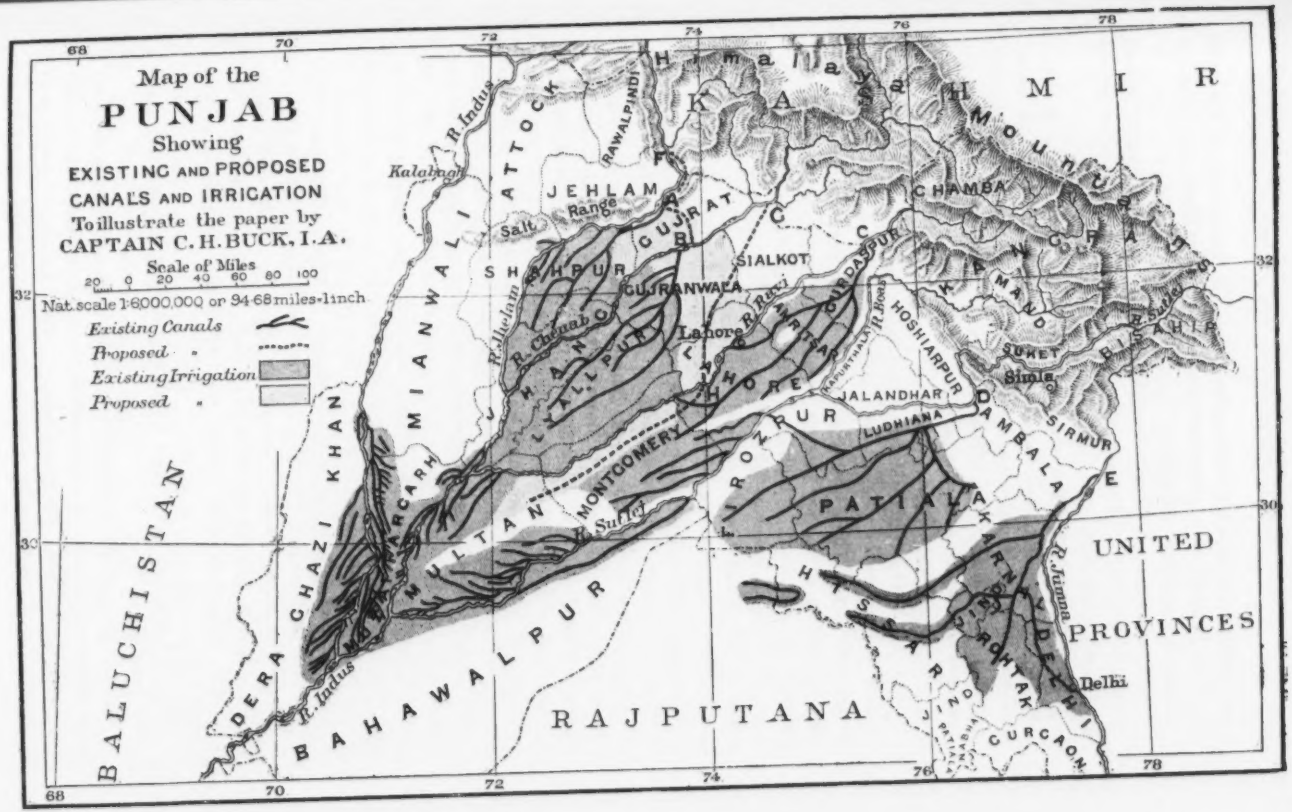
The land between each of the five rivers and between the Sutlej and the Jumna, south-west of the Himalayas, is to the eye as flat as a pancake, but there is in reality a gradual incline towards the south and south-west, so that any canal, which has its head near the hills and on the left bank of any of the three rivers first mentioned, is able to command practically all the land to the west which lies between the river it takes out from and the river next on the south. Canals from the Sutlej are likewise able to command large areas on the south of its course, but the Beas has not been utilized, owing to the land between it and the Sutlej being rather too high.

The principal perennial canals at present existing in the Punjab are as follows: A, the Jehlam canal; B, the Chenab canal; C, the Bari Doab canal (*Bári* is a unison of the two names Beas and Ravi, *do* = two, *áb* = waters); D, the Sirhind canal (*Sir* = head, *hind* = India); E, the Western Jumna canal.

In addition to these there are numerous small inundation canals, which give a supply of water along the sides of each of the five rivers and of the Indus when they are in flood during the hot weather; these are shown on the map by small lines.

Of the twenty-eight districts in the Punjab, only Mianwali, Attock, Rawalpindi, Gujrat, Sialkot, Kangra, Hoshiarpur, Jalandhar, Ambala, and Simla are without canal irrigation, but most of these are so situated that they derive much benefit from small hill torrents, from the cooler climate and natural moisture in the soil, or from the fact that the water in the wells, on which they principally depend, is only 15 to 30 feet below the surface.

Of the canal-irrigated districts, Hissar and part of Rohtak are the worst off; they are at the tail end of the Western Jumna canal, and


Map of the
PUNJAB
Showing
EXISTING AND PROPOSED
CANALS AND IRRIGATION
To illustrate the paper by
CAPTAIN C. H. BUCK, I.A.
Scale of Miles
20 0 20 40 60 80 100
Nat. scale 1·6000,000 or 94·68 miles=1 inch
Existing Canals
Proposed
Existing Irrigation
Proposed
68
70
72
74
76
78
32
30
R. Indus
Kalabagh
ATTOCK
RAWALPINDI
Himalaya
KASHMIR
MOUNTAINS
JEHLAM
Salt Range
GUJRAT
CHAMBA
KANGRA
SHAHPUR
GUJRANWALA
SIALKOT
R. Jhelum
R. Chenab
R. Ravi
GURDASPUR
HOSHIARPUR
SUKET
SIMLA
BISAHIR
LYALLPUR
LAHORE
AMRITSAR
KAPURTHALA R. Beas
JALANDHAR
LUDHIANA
SIRMUR
AMBALA
MIANWALI
JHANG
MONTGOMERY
FEROZPUR
PATIALA
KARNAL
DELHI
HISSAR
SIRSA
ROHTAK
GURGAON
Delhi
R. Jumna
R. Sutlej
DERA GHAZI KHAN
MUZAFFARGARH
MULTAN
BAHAWALPUR
BALUCHISTAN
RAJPUTANA
UNITED PROVINCES

the former receives very little water, while the water-level in the wells in both districts is a great distance below the surface, and both are subject to periodical droughts.

Mianwali and the northern portion of Muzaffargarh and western part of Shahpur consist to a large extent of Government waste, and are at present unirrigated.

The perennial canals A to E, with their main branches, are shown on the map by lines, and these, with their distributaries and water-courses, form a gigantic network of channels throughout the areas, shown shaded on the map. The tracts depicted by cross-hatched lines are those for which a new project, recently sanctioned by Government, has been conceived.

There is in the Jehlam a large surplus of water—and sometimes a certain amount in the Chenab—which hitherto has run to waste owing to the inability of the existing canals to carry more, and to the land commanded by them receiving as much water as is necessary; on the other hand, the Ravi, which is a smaller river, frequently dries up altogether in its lower reaches during the cold weather, and all the water which comes down it from the hills is taken off at C by the Bari Doab canal; a great area of Government land is lying waste in the Gujranwala, Montgomery, and Multan districts, and a remarkably ingenious plan has been thought of for the irrigation of these tracts. A canal—to be called the upper Jehlam canal—will be dug from F, and carried round the end of a small range of hills in the Gujrat district, thence in a south-easterly direction until it runs into the Chenab just above B, the head of the Chenab canal. Another canal —called the upper Chenab canal—will be constructed from G, through the Sialkot, Gujranwala, and Lahore districts, to a point, H, on the Ravi; here it will be carried by means of enormous syphons under the river, and thence across the western corner of the Lahore district, through Montgomery into the Multan district; after passing the Ravi this canal will be known as the lower Bari Doab canal. Sufficient water for canal A will always be allowed to pass down the Jehlam, and of the remainder as much as is required will be taken off by canal F to irrigate the hatched portions of the Gujrat and Shahpur districts, and to fill up the supply in the Chenab for canal B. Water will thus be available in the Chenab for canal G, which, before passing under the Ravi, will irrigate a small portion of Sialkot and the greater part of Gujranwala.

I think I may safely say that a bolder irrigation scheme has never before been adopted.

There is yet another large scheme on the *tapis*, and that is the Sind Sagar project to irrigate the tract south of the Salt range between the Indus and the Jehlam; there has been a certain amount of doubt as to the feasibility of constructing a canal through this tract, owing to its

surface being composed to a great extent of undulating sandhills; it is certain that its cost would be enormous on account of the difficulties which would be incurred, and it could hardly be a paying concern, but would be a sound protective measure. The head of such a canal would be on the left bank of the Indus, somewhere near Kalabagh.

During the last twenty years the canal system of the Punjab has received an enormous impetus; the western Jumna, Sirhind, and Bari Doab canals—the latter especially—have been considerably extended, and numerous new inundation canals have been constructed, while the Chenab and Jehlam canals have been made and colonization operations on the former successfully carried out, and those on the latter placed in full swing. The next twenty years will, with the further developments I have already mentioned, show a similar, if not greater, advance.

A few figures will show what a wonderful success the Chenab canal has proved financially. Before colonization operations commenced, the 1,800,000 acres of Crown waste only gave a revenue of a few hundred pounds on account of grazing rights, while now the same land pays a revenue of over £70,000, in addition to the water and other rates credited to the canal. This canal commands over 3,000,000 acres, and irrigates annually about 2,000,000 acres, while there is a net profit to the State of £450,000, which gives a return of 23 per cent. on the capital cost. The annual value of the crops on the land irrigated by this canal amounts to about £4,000,000 sterling, and the total value of goods carried in 1904 from the new railway—which passes through the tract commanded by the canal—and exported from the port of Karachi amounted to about £2,800,000. These goods consisted, among other things, of 357,000 tons of wheat, 100,000 tons of other food grains, oil-seeds, and cotton, and the total freight paid was over £450,000.

The Jehlam canal is designed to command about 1,100,000 acres of culturable land, and will pay over 15 per cent. on a capital cost of $1\frac{1}{4}$ million sterling, while the estimated expenditure on the upper Jehlam, upper Chenab, and lower Bari Doab project, which will command over $4\frac{1}{2}$ million acres of culturable land and irrigate almost 2,000,000 acres, amounts to a little more than £5,000,000, and is expected to give a direct return of 10 per cent. on the capital outlay.

The length of the main lines of the existing Punjab canals exceeds 3000 miles, while that of the branches is over 2000 miles, and of the distributaries about 12,000 miles. When it is considered that the main line of the Chenab canal has a bed 250 feet wide, carries a depth of almost 11 feet of water, and discharges 10,800 cubic feet per second—or about fourteen times the amount ordinarily discharged by the Thames at Richmond, some idea may be obtained of the magnitude of the whole system, and the wonderful achievement of the engineers who designed and constructed these canals. To the ordinary onlooker it is little

short of marvellous how the water is controlled so that each little watercourse receives its supply at regular intervals, and each cultivator is enabled to irrigate his land as his turn comes round. It is also wonderful how the levels are all accurately taken over vast stretches of barren waste and the position of even the smaller channels marked out, so that the water flows to the nethermost corner when they have been dug and opened. As a matter of fact, the discharge through the head-works of a canal can be regulated to a fraction by means of sluice-gates; while the amount each branch and distributary is to take, and the periods they are to take it for, are all worked out by simple formulæ; and the telegraph lines, which flank all the main channels, are used for conveying the necessary instructions. Then, at certain points along the main lines, branches, and distributaries sluice-gates are placed in connection with channels leading back to the river or to depressions, so that surplus or flood water can be allowed to escape when necessity arises.

Working at the construction of a new canal through an inhabited tract of land, as may be imagined, is much more pleasant than the making of one through what is practically a desert. In the latter case, one has the greatest difficulty in getting supplies and accommodation both for one's self and for the subordinates and labourers; in fact, on first starting, one sometimes has to live and work in a tent, when the temperature in the shade is over 115° Fahr. Some time before a new canal through Government waste is completed an Indian civilian is appointed to supervize the colonization operations, and his work may be said to be never-ending. Under the guidance of this officer, who is generally helped by an assistant—also an Indian civilian—a huge establishment has to survey the tract, mark it out into squares of about 27 acres each, divide it into various circles for administration purposes, and again into villages. As soon as the preliminary arrangements have been made, the squares have to be allotted to settlers. The classes, and approximate numbers of each class, and the districts they are to be obtained from, are decided on by Government, in consultation with the colonization officer, but this officer is given a fairly free hand in obtaining them and in allotting the squares.

The land is granted mostly to peasants selected from congested districts and from neighbouring riverain villages when their land has in any way suffered by reduction of water in the rivers, but a considerable area is set aside for distribution among Government pensioners, both civil and military, who have done good service, while occasionally a few thousand squares are put up to auction in large plots in order to introduce a capitalist element into the colony. The ordinary peasant grantees receive only one square apiece, but those who are of good family or high standing in their old districts, or who for some reason deserve a reward, frequently receive a larger grant, which may extend to ten squares, but usually to not more than five. Native cavalry regiments

were offered grants of from sixty to a hundred squares for the establishment of remount depôts and horse-breeding farms, and most of them have taken advantage of this. In the Chenab colony (now known as the Lyallpur district) three camel-transport corps are maintained by granting squares on certain conditions to camel-owners. Among the provisos is one by which the grantee has to maintain one male camel fit for transport duty, and three female camels for each square he has received; when called upon for active service, the grantee has to provide one driver for every three camels.

Among his numerous other duties, the colonization officer has to arrange for the sites of the towns and villages; for those of buildings, such as hospitals, schools, police-stations, and other public offices; space has to be reserved for factories along the railway; and plots have to be kept for aboricultural plantations and nurseries, and for an experimental farm.

Besides the more practical operations, there is an enormous amount of head work to be done in the way of deciding the rates to be charged for water-supply and land revenue, etc.; the records, too, which have to be started and maintained, regarding the rights in the various holdings, the crops grown, and the revenue, rates, and fines to be collected, suspended, or remitted, are innumerable, and the forms for all the necessary registers have to be most carefully drawn up.

The settlement of the tract irrigated by the Chenab canal was the first large colonization project in the Punjab, and consequently was exceedingly difficult. The colonization of the Jehlam canal tract is now in full swing, and somewhat easier, for the officers in charge have the benefit of the experience gained in the formation of the first colony, and they can work on more or less well-defined rules.

Before settlers arrive in a village the streets and building-plots are all marked out, and as they appear on the scene they are allowed a certain amount of choice in the selection of sites for their homesteads and of the position of the squares they will cultivate. The site for the habitations is usually in the shape of a square or oblong, and consists of one, two, or more squares of 27 acres each, in accordance with the culturable area. In the centre there is usually an open space, in which only one small building is erected for use as a post-office, village surveyor's office, or for some other public purpose, and the village well. Around or close by this space are the sites for the village shops; small plots are also set apart for the residence of the headman and other rural officials. On the outskirts, at one side, an area is reserved for the huts of the menials and persons of low caste.

The houses in one of these villages are usually built of sun-dried earthen bricks, wooden beams, rafters, and posts. They have flat roofs, and are plastered inside and out with a mixture of mud and crushed straw. A few are occasionally made of more substantial materials, such

as kiln-burnt bricks, cement, and iron girders. Strict rules have to be made and rigorously enforced to ensure sanitation and the preservation of the public health; thus earth can only be taken from selected spots, which are afterwards used as tanks, and one of the most important is that which directs settlers to sink, within a prescribed period and from a common fund, a good well of burnt brick for drinking-water. In order to prevent persons building on land allotted to others, or in unauthorized places, and to stop outsiders squatting in villages, heavy rents can be levied in the shape of fines, and it is sometimes necessary to impose these penalties before a village has got into proper working order.

While the colonization of one of these enormous tracts is proceeding, arrangements have to be made for the extra police and the criminal, civil, and revenue courts, which become necessary owing to the rapidly increasing population, and, as the colony develops, it is at length found expedient to form it into a new district, with a full staff of civil and police officers. A local board is then formed, which deals with the hospitals, schools, roads, and buildings, and a great deal of work is taken off the hands of the colonization officer, who can thus devote himself entirely to the final settlement of the colony.

The construction of a new canal through a large stretch of waste land results, of course, in a great development of agriculture and trade, besides an increase in the population; consequently one of the first matters to be considered is the communications. The railway and the main roads have to be ready when the canal is opened, so that the colonists can sell their surplus produce and send it away. As the irrigation is extended, feeder lines have to be constructed and more rolling stock obtained. Not only does the railway department have to keep its eyes open, but the postal, telegraph, and other Government departments also have to advance with the times.

The colonization officer is consulted by one and all, and he has to be ready at all times with information on even the most minute details. It will thus be seen that the duties of this officer are exceedingly heavy, and the post can only be filled by a man of tact, great capability, and immense capacity for work.

That Government does not demand too high a revenue from the colonists is distinctly proved by the fact that hordes apply for grants and have to be refused. I may mention here that a peasant who has good land in a colony is able to make a clear profit of £30 per annum per square, while even an inferior square will give him a profit of £15 to £20 per annum. This may not seem a very fat income to an Englishman; but it must be remembered that a native can easily support himself and a large family on £12 a year.

In conclusion, I have to say that the extension of irrigation has conferred a great boon on the people of the Punjab. Labour is always to

be obtained, and those tracts affected by drought send forth their thousands to work in the colonies and on the canal-irrigated lands, so that famine in the Punjab is almost a thing of the past. Owing to the fact that the colonists and their friends and relations pass to and fro between the various parts of the province and the colonies, the people generally have more intercourse with one another, and are becoming more open-minded. Factories are now quite numerous, and trade generally has rapidly improved, while the money circulation is much greater than heretofore, and I think I may truly state that the eyes of the masses have been opened to the great benefits they are receiving under British rule.

NATURAL MOUNDS IN CAPE COLONY.

By ERNEST H. L. SCHWARZ, Professor of Geology, Rhodes University College, Grahamstown.

THE interesting discussion that has been going on in the columns of *Science* with reference to the subject of Natural Mounds in the United States, which was noted in the Monthly Record for August, has prompted me to write the following note on a similar occurrence in the coastal districts of Cape Colony. It has long been a subject of interest to me, and I have several times tried to come to some conclusion in regard to their origin, but, like Mr. Veatch, have not been able to satisfy myself that any explanation brings us nearer the solution of the problem. The theory that they are disintegrated ant-hills, favoured by Prof. Hilgard, brings in the least amount of speculation, for ant-hills are very prevalent all over South Africa, and I have even seen them on Micham common, near London, distributed over the surface in the same manner as our natural mounds occur in South Africa. Mr. Purdue's objection that the ant-hills found in among the natural mounds are very much smaller than the latter is not of such weight in the Cape Colony, as the species of termites that formed the mounds—supposing for the moment that the ant-hill theory holds good—may very well have been the same as that which builds the huge ant-hills in Rhodesia, but which have died out in the south of the sub-continent. The bones of the eland and rhinoceros in the sand-dunes round Cape Agulhas show that these animals, now confined to the north of the Orange river, once lived in the country of the natural mounds, and as it is probable that climatic change, as well as the presence of the white man, has exterminated the larger animals in the south, so it is not unreasonable to suppose that the Rhodesian termites once lived in the south also.

In the colony the mounds may be seen in any sandy ground near the coast, covering the surface with bare patches; but the want of vegetation is due, I think, not to the nature of the soil, but to the

baking of the surface, after it has been wetted by the rain, by the intense heat of the sun. Where a wheel has gone over one of the mounds and broken the hard crust, bushes spring immediately. In cultivated land the farmers aver that these hillocks are more productive than the rest of the soil, and Mr. Juritz, senior analyst of the colony, mentioned in his address to the British Association in Cape Town, that a levelling of these hillocks results in an increase of the fertility of the soil all round.

The most accessible place for seeing these mounds is on the lower slopes of the hills of Bokkeveld and Witteberg beds on the top of the Hex river pass, on the main line to Johannesburg; they appear as red splotches on the bush-covered slopes. The elevation here is only a few inches, and the diameter some 5 or 6 yards. In the Malmesbury district they occur on the flats below the hills, and are formed of light yellow argillaceous sand. Here they have usually a depression in the centre, which is often occupied by a clump of arum lilies, although the surrounding country is far too dry for these moisture-loving plants to exist.

After seeing these Malmesbury mounds I went into the Ceres Karroo, and at Hartnek's kloof found an actual spring bubbling up from sandy ground, and round each of the eyes there was a perfect circle of grass, raised a few inches above the general surface. I afterwards saw many of these sand fountains, and for a time my mind veered round to an aqueous origin for the hillocks.

East of Worcester, however, near the station Over Hex, there is a large tract of country under the Langebergen, covered by a fine yellow alluvium, not unlike loess in texture, and a great portion of this is occupied by gigantic hillocks some 8 to 12 feet high and some 10 yards in diameter. In places these are so closely packed that the bases mutually impinge; the angle of slope varies, but often is as acute as in a volcanic cone. There are many good sections of the mounds available along the railway here and in the road-cutting, but nowhere is there any internal structure visible; the whole substance of the hillock is the same throughout, and consists of fine argillaceous sand like the surface soil, without the least sign of vegetable or animal remains included in it. The soil becomes so hard where it is allowed to dry quickly after being moistened, that square blocks can be dug out and sun-baked, and can then be built into walls, where they will stand unprotected for many years.

In the red-sand country of Bushmanland the mounds also occur, and the substance of the hillock is more argillaceous than that of the surface soil; the bushes grow closely packed together on these spots, which are perfectly circular, although the rest of the ground is sparsely covered except after rain, when the grass grows. I never noticed our donkeys feeding on these clumps, however, although the luxuriance of the bush ought to have attracted them.

Another possibly connected phenomenon is that of the small patches of poison veld that occur in among the ordinary veld with apparently no cause for the nature of the bush. I know two such patches in the colony, one high up under a krantz in the Nieuweveld, and the other in the open plains north of Matjesfontein. The areas are a few acres in extent, but there is no demarkation between the good and the bad veld; the bush is the same in both, and the farmers say that the plants absorb their poisonous properties from the soil. That these areas are very poisonous I had ample experience, for when I was outspanned near the Matjesfontein patch, a drove of slaughter-oxen came down from Sutherland and wandered into the poison area, and three or four were immediately stretched stiff on the ground. Similarly, a little blue iris that grows plentifully throughout the country in some places, Baviaan's Kloof, for instance, and at certain times of the year, becomes very poisonous to cattle, while at other places it is apparently harmless.

The opposite of the hillock veld is the Kommetje * veld, where the ground is honeycombed with little shallow depressions. I have not seen a typical spot, but on the flats to the north-east of Fort Beaufort there is a fair example of this kind of surface. The ground was cut level by marine denudation, and in the shelves at present awash with the tide there is a layer of calcareous sand, which becomes hardened into limestone by the deposition of calcium carbonate. The process by which this is brought about is probably that the sea-water, containing a certain amount of lime in solution by reason of a small amount of carbonic gas held in it also, becomes left behind at low tide, and becomes warmed by the heat of the sun; when this happens, the carbonic gas is driven off, and the lime is thereby precipitated, and goes to cement the sand-grains together. The limestone forms low reefs enclosing shallow pools, which are alive with shore-forms of marine life. It seems probable, then, that when the sea retreats from off such a shelf the hard rims of these pools will persist, and afterwards, when they become removed, together with all the other material deposited on the hard rock when it was awash, the lime of the rims will sink into the underlying surface and harden it; the flat surface will be thus parcelled out into areas within which the rock will be softer, and under the action of denudation will become covered with shallow depressions. The true kommetje veld, however, has been described to me as one succession of circular hollows in similar aggregation to that of the hillock, and thus the hillock and saucer may be related in origin. The discussion of depressions, however, includes that of the pans in South Africa generally, some of which are 20 miles in diameter, and the subject is too complicated to be referred to in this note.

* *Kommetje* = saucer.

THE GEOGRAPHICAL CYCLE IN AN ARID CLIMATE.*

By Professor W. M. DAVIS.

THE geographical cycle is a name for a long period of time in which an uplifted land-mass will, if no disturbance occurs, be worn down to baselevel by the processes of erosion. The cycle will be longer in a region of resistant rocks, and shorter in a region of weak rocks. During its passage the changes from the broad-featured initial forms produced by uplift and deformation are followed by the more varied sequential forms due to the active processes of valley erosion, and these in turn are succeeded by the monotonous ultimate forms of planation at baselevel. The succession of forms through the cycle is so orderly and systematic in many respects that a landscape may be described in a general way in terms of the stage of the cycle that it has reached: thus the scheme of the cycle is of practical service in geographical observation. The essential features of this scheme were outlined some years ago ("Geographic Methods in Geologic Investigation," *Nat. Geogr. Mag.* 1, 1888, 11–26), and presented in more detail at the International Geographical Congress at Berlin in 1899 in a paper published in the *Geographical Journal* for that year, as well as in the *Comptes Rendus* of the Congress. There are, however, many departures from the simpler conception of the scheme; some of these were discussed in a paper on the "Complications of the Geographical Cycle" before the International Geographic Congress at Washington in 1904, and published in its *Proceedings*. Not only the forms of lands suffer changes during the progress of the cycle; the distribution of organic forms is also greatly affected by the slow changes of land-form through the cycle as well as by the accompanying normal changes of climate that accompany the degradation of a mountainous highland to a featureless lowland. Biologists are coming to take more and more account of the changes in distribution thus brought about, and are finding therein the solution of many problems of peculiar interest.

The usual conception of the cycle takes account of the action of the ordinary or normal forces of erosion, such as included under weather and streams. The action of the sea waves and currents on the shore-line should be therewith associated; the fullest statement of this aspect of the problem is to be found in the thesis of one of my former students, Dr. F. P. Gulliver, on "Shore-line Topography" (*Proc. Amer. Acad., Boston*, 34, 1899, 151–238). But besides the normal forces of degradation there are two groups of special forces; the one is characteristic of a cold or glacial climate, the other of an arid or desert climate. The first of these I have briefly considered in an article on "Glacial Erosion in France, Switzerland, and Norway" (*Proc. Boston Soc. Nat. Hist.*, 29, 1900, 273–322). The point there urged is that we must not only study the forms produced by glacial erosion, but that we must arrange these forms in their order of development, and thus distinguish carefully between a district slightly modified by glacial erosion and a district profoundly modified by glacial erosion, as we do between a district on which ordinary erosion has just begun its work by cutting narrow valleys, and one in which the work has progressed much farther and brought forth a maturely and elaborately carved surface of hills and valleys.

The features of the arid cycle are more fully set forth in an essay bearing the same title as this paper, and published in the (Chicago) *Journal of Geology* (13, 1905, 381-407). Here the effort was made to follow the changes that an extensive

* Read at the Johannesburg Session, Section E, British Association, August 30, 1905.

desert region would suffer in a climate so dry that none of the initial depressions due to deformation were filled with overflowing lakes, that most of the streams formed by rainfall on the uplands would wither away as they descend, and thus fail to unite in trunk streams on the lowlands, and hence that no definite relation would be established with the normal baselevel of the ocean surface, such as obtains with so much force in the normal cycle, where all streams reach the sea, and hence carve valleys whose floors are graded with respect to sea-level or normal baselevel. The conditions of erosion in desert regions have been well studied by various writers, notably by Walther, in his 'Gesetz der Wüstenbildung' (Berlin, 1900); but suggestions of the greatest value in the present connection have come from the writings of Passarge, whose work on 'Die Kalahari' (Berlin, 1904) constitutes a very important contribution to desert morphology, and whose brief essay, "Rumpffläche and Inselberge" (*Zeitschrift deut. Geol. Gesellsch.*, **56**, 1904, Protokol, 193–209), announces a principle that will, I believe, gain wide recognition as of essential importance in the broader considerations connected with the evolution of desert regions. A brief outline of the arid cycle is here presented.

In a region whose aridity is determined by widespread climatic factors, an uplift of the Earth's crust may initiate a land surface of any structure, with any form and any height. The scanty rainfall will form streams here and there on the highland slopes, but they will not, as a rule, unite in trunk streams in the lower lands, nor will they form overflowing lakes in the basins. Each basin of deformation will therefore, in the earliest stage of the cycle, be occupied by a number of centripetal streams, constituting a potential but not an actual river system; and each of these systems will be independent of its neighbours. In strong contrast with the early stage of the normal cycle, when large trunk rivers actively entrench their valleys, and thus increase the variety of relief over its measure due to initial deformation, the processes of the arid cycle at once tend to decrease the initial relief by washing the waste from the highlands, and building up or aggrading the basin floors. True, the highlands will be locally dissected, but the aggradation of the basin floors will constantly tend to discourage the centripetal streams from cutting deeper in their lower courses. As time passes, adjacent basins may become confluent, not indeed by the establishment of a trunk river from one to the other, but by the development of a slope on which the waste may be washed—when rain happens to fall there—from one basin to the next. This may take place in two ways: The higher basin may be aggraded to such a height that its accumulating waste will rise to the level of the lowest point on the basin rim, when overwash and invasion of the lower basin will result; or the walls of the lower basin may be retrogressively eroded so as to drain or capture waste from the higher basin. Thus two previously independent drainage systems merge or coalesce into a single system; and as changes of this kind increase in number, the youthful stage of the cycle may be regarded as passing into the mature stage. As maturity advances, there will be an increasing coalescence of drainage systems, and an increasing regard for the control of the central desert baselevel, determined by the slowly aggrading and rising floor of the largest and lowest basin to which the other basins have become tributary. When maturity is so far advanced that the initial highlands of deformation are greatly dissected and degraded, we may picture the region as consisting of three kinds of surfaces; first, a central plain of aggradation with fine-textured waste towards its centre, but with coarser-textured waste around its margin; second, degraded, rock-floored plains veneered with irregular patches of gravels and sands, and graded so as to slope gently to the central aggraded plain; and third, residual mountains and hills composed chiefly of those rocks which best resist arid erosion. It is thus

seen that, if the terminology here suggested is adopted, the maturity of the desert cycle is the time of the greatest coalescence or integration of drainage, with which is associated a relatively small measure of relief; and thus the maturity of the desert cycle is unlike that of the normal cycle, in which maturity is not only the time of the fullest development of drainage processes, but also the time of the greatest measure and greatest variety of relief.

Thus far nothing is said of the action of the winds. In the normal cycle the winds are of little importance, because the plant-cover defends the surface of the ground from their action. In the desert cycle the winds are of great importance, because the vegetation is so scanty that the winds sweep the ground freely, and thus become important agents of erosion and transportation. While the relief is yet strong, as in youth, the winds are not dominant, for then the occasional rains have strong slopes to act upon, and make up for their prevailing absence by their occasional energy. But when maturity is reached, and great expanses of waste plains and rock plains have been developed, the winds may become dominant agents of erosion. It must here be remembered that the winds do not depend on the slope of the land surface for their acceleration; they are impelled to move by barometric, not by topographic, gradients; and barometric gradients may be dependent either on those wide differences of temperature that are determined by the spheroidal form of the Earth, or by those local and vertical differences of temperature which are instituted particularly on plains, and which result in violent whirlwinds and dust-storms. Furthermore, the winds are not systematically divided, like rivers, into branch and trunk streams, with steeper headwaters and gentler lower slopes. The winds are relatively unorganized; a light breeze may be succeeded by a sweeping samum; and, far from acting only in the direction of local slopes, the stronger winds may sweep sand along a level surface and even up a surface of significant grade. Indeed, the whirlwinds that occur so commonly on desert plains may raise dust far aloft, and give it over to the higher currents, which may then carry it outside of the desert region from which it was gathered, and strew it over neighbouring moister lands, or let it fall into the ocean. Finally, the winds have, in virtue of their unorganized manner of flow, no baselevel with respect to which their work is carried on; and in this respect a wind-swept desert resembles in a certain degree the bed of a river or of a glacier. The whole desert region is, indeed, the bed of the winds; and hence they may sweep out a basin here, where the rocks disintegrate into a fine-textured waste, or build up a mound there, where sands are supplied in excess of their removal. There can, therefore, be little question that the winds will thus in the later maturity of the cycle greatly disturb the integration of the drainage system previously established.

If the imagination be now given free play, and the duration of the undisturbed cycle be sufficiently prolonged, a new order of changes must be recognized. The long-continued removal or exportation of dust by whirlwinds and the upper wind currents must result in the very gradual degradation of the desert surface; and as the degradation goes on, there must be a progressive decrease in the area of the central waste-covered plain, and a corresponding increase in the area of the surrounding rock-floored plain; and if time endures long enough, the whole surface must thus be worn lower and lower, until practically all the central accumulation of waste in the largest and deepest of the original basins is exported; then a surface of bare rock, here and there veneered with a thin cover of waste, will everywhere prevail. The rock desert will even then continue to be worn lower and lower by the unceasing exportation of its dust; and there appears to be no reason why it should not—in a large continental desert area—be eventually worn below sea-level.

The form that the rock desert will assume after the winds have come to be the dominant agents of erosion and transportation is an interesting subject for inquiry. When it is remembered that the winds have no baselevel with respect to which their action is regulated, it might at first be inferred that they would in time excavate deep hollows wherever the rocks weathered into sand or dust. This curious condition of increasing relief with advancing old age is truly expectable in absolutely rainless deserts; but, as Passarge has pointed out, there is good reason for thinking that, in ordinary deserts, where rain occasionally falls in sufficient quantities to produce floods, the winds can never become so strongly dominant as to produce a very uneven rock floor. Wherever a shallow basin is initiated by the sweeping winds, the next rain will spread a sheet of sand and gravel over the floor of the depression, and thus very effectually retard or prevent the further deepening of the basin. As these accidents happen with advancing old age, the integration of drainage that characterized maturity will be seriously interfered with, and many small and independent drainage systems, indefinite and variable as to their borders, will be established, thus recalling something of the conditions of youth. Nevertheless, the region will still be a plain, except for the scattered residual monadnocks, or "island-mountains," as the Germans call them, even when the surface is worn down so low as to lie beneath the bottom of the deepest original basin, and hence to have a rock floor throughout, hidden only by the relatively thin veneers of gravel and sand that are spread here and there by the sheet-floods. It is important to add that the rock plain thus formed has no definite relation to baselevel, and thus differs essentially from the narrow plains of marine erosion, and from the broader peneplains of normal subaërial erosion, already familiar to geographers and geologists.

A geographical discussion so manifestly speculative as this one has intentionally been can have practical value only when the result of the speculations is shown to correspond to actual phenomena. It is the peculiar merit of Passarge's work that he has given good reasons for thinking that the broad rock plains of the Kalahari and certain other deserts, here and there floored over with thin sheets of gravelly waste, have actually been produced by such processes as are here sketched. But if this be true, and if the later stages of the arid cycle are thus actually verified in the South African deserts, there is ground for thinking that the other stages of the arid cycle will in due time be confirmed by the features of deserts in other parts of the world. The deserts of the world may then, as the more favoured parts of the world can already, be described in terms of a series of forms developed in orderly sequence during the progress of their appropriate cycle of geographical development, and a valuable addition will thus be made to systematic geography.

REVIEWS.

ASIA.

Eastern Asia.

'The Far East.' By Archibald Little. Oxford: Clarendon Press. 1905.

In this volume, which forms one of the series of 'The Regions of the World, Mr. Little has treated of the whole of the Chinese Empire, with its dependencies past and present, extending as far west as Chinese Turkestan, and also of Korea and Japan. His intimate and long acquaintance with China, and the special knowledge which he possesses of the Yangtse basin, lend an interest to the book

which more than compensates for any of the disqualifications for the task which, in his preface, he assigns to a writer so far from a literary centre as he finds himself in Sze Chuen.

Naturally enough, the country and provinces with which he is more intimately acquainted are more fully discussed than those which he knows only through books or as an occasional visitor. The chapter on Japan, which bears signs of having been written before the outbreak of the late war, is consequently very short compared with those assigned to China, and greater fulness of treatment is found in the portion of the volume assigned to the Yangtse basin than in those which consider the other portions of China and her dependencies.

Without in any way disparaging the rest of the work, the most attractive chapters are those which relate to Se Chuen and Shan Tung. In Se Chuen Mr. Little has made his home, and he writes of it with almost the affection of a native. In Shan Tung the attention devoted to the province by the late Baron von Richthofen has allowed Mr. Little to consider the geographical and geological features of the province in an exhaustive manner, which is fully warranted by the interest attaching to the province through the development which it is gaining by German energy.

It is more especially to the geography and geology of the Far East that Mr. Little devotes himself throughout, but incidental allusions to the industries and habits of the peoples, their history, commerce, and peculiarities, together with the author's theories on various vexed questions, such as the descent of the Chinese, etc., relieve what might otherwise be, perhaps, a heavy volume.

The author divides China into the Yellow river, Yangtse, and Canton river basins and the intermediate provinces (viz. Che Kiang and Fu Kien), which have independent water systems. The dependencies, which he speaks of as deliberately acquired by China with a view to their forming buffer states (p. 12), are Manchuria, Mongolia, Turkestan, Tibet, Indo-China, Korea, and Siam. The chapter on Japan includes Formosa, but the Luchu islands have not received any notice.

Baron von Richthofen's 'China' forms the base on which Mr. Little has built up his descriptions of the orography or geology of China; and for those parts of South China which are not described in Richthofen's great book, the author has apparently relied upon Mr. Kingsmill. No reference is made to the more recent theories regarding the mountain systems of China, which would appear to be continuations or prolongations of those in North-East Asia, having an almost uniform direction of east-north-east and west-south-west, a direction which is scarcely interrupted by the chains thrown transversely across them. Thus, Prince Kropotkin writes: "Instead of the mountains running west to east, or east-south-east, under the names of Tsin-ling-shan, Minshan, etc., which were formerly traced in the south of the Hoang-ho, we have here the terrace-like slopes, marked by three escarpments, running due north-east to south-west, by which the Tibet plateau descends towards the plains of China." This direction of the mountains appears to continue as far west as Kobdo, and to be found not only in the mountains in South-East China to which Richthofen gave the name of Nan Shan, but also to obtain throughout Hunan to the south-west of China. Dr. E. Tiessen, in his 'China das Reich der XVIII. Provinzen,' adopts the same theory of plateaux, escarpments and the north-east to south-west direction of mountain ranges, as Prince Kropotkin, and it would appear from his book that von Richthofen himself held the same opinion in the latter years of his life.

One of the most interesting chapters in 'The Far East' is that which tells of the engineering feat by which in the third century B.C., the plain of Chengtu was converted from a field of boulders into agricultural land irrigated throughout its

whole extent, 2800 square miles, and capable at the present day, thanks to the constant attention given to the maintenance and improvement of the works, of supporting the densest population to be found in China. The marvellous crops produced—according to Mr. Little, there are five crops in the year—are the more surprising in that sunshine is so rare that, according to a local proverb, "the dogs bark when the sun shines."

The maps liberally interspersed throughout the book cannot be said to be all of the same merit. Some are excellent, but that on Mongolia not only does not embrace the whole of the country reviewed in the articles, but adopts a different system of transliteration of the names of places to that followed by the writer. There is no good map of Manchuria; and the interesting meteorological charts on pp. 156, 157 lose half their value through the blurred type of the letterpress.

In a volume of so large a scope it is impossible that there should not be some errors and occasional contradictions. For instance, the population of China proper is estimated at 380 and at 300 millions in different parts of the book, and there is a curious statement that the population has nearly doubled during the last century, though Prof. E. H. Parker's tables show that the population in 1842 was 17 millions in excess of that in 1902, which he estimated at 407 millions. The prices of ginseng, wild and cultivated, are incorrectly given. It is, of course, the wild ginseng which is the more valuable, but in any case the prices quoted are too high. Again, Kowloon was not leased but ceded to Great Britain in 1860, when the lease previously granted to (Sir) Henry Parkes by the Governor-General of the Kwang provinces was cancelled. On the rendition of Ili to China, the country was not restored intact. The western portion, over 4000 square miles, remained in the hands of Russia. In the description of Formosa, it is necessary to warn the reader that the Taiwan mentioned as 2½ miles from An-ping is the old city of Tai-wan-fu now known as Tai-nan, and not the Tai-wan which figures in the map.

But these and other errors which occur are minor blemishes. Throughout the book there is great evidence of care and attention. The description of the ancient routes through Central Asia, and of the lines of approach to Yunnan from Burmah and Tonquin are chapters which especially illustrate this. If exception is to be taken to the book, it is rather on the score of the lack of information regarding the mineral products of China, and especially of that of gold in the west, regarding which so little has ever been made public. But those who are interested in China can hardly fail to find much in this volume which will add to their stock of information and stimulate them to further inquiry.

W. R. C.

Eastern Palestine.

'The Jordan Valley and Petra.' By W. Libbey, sc.d., Professor of Phys. Geography, Princetown, and F. E. Hoskins, d.d., Syrian Mission, Beirut. 2 vols. 159 *Illustrations*. New York and London: Putnam's Sons. 1905.

A pleasant but somewhat lengthy account of a holiday ride down the Jordan valley (east bank) to Karak, Tafileh, and Petra, and of the return to Jerusalem round the south end of the Dead sea. The authors describe in an interesting manner the chain of trans-Jordanic ruins which they passed from Gerasa to Petra, but with imperfect knowledge of their archæological character. The distinctions between Greek, Græco-Aramean, and Græco-Roman remains are more definite than they appear to be aware of. The structure and relief of the Ghor is treated with more science, but naturally in a summary manner, since the authors had no opportunity for detailed study. The theory which the authors formed as to the genesis of the actual landscape of the rift must remain unproven until

more evidence is adduced in its support than is given in these volumes. In these matters, as in some others with which they deal, the authors hardly show enough knowledge of what has been already done and written. The long and elaborate preparation which they describe themselves as having made for a short journey over fairly well-known routes seems to have disposed them to magnify both their novelty and their dangers. The slopes of Bashan, Ammon and Moab, immediately east of Jordan, are far from a *terra incognita*, and Petra is a resort of tourists. Even the northern part of the Darb al-Haj has been very often traversed and described, both before and since Doughty's classic account of it. The illustrations are good. The photographs of Petra are a fine set, and others show very well the superficial features of the eroded formations in Arabia Petræa. On the whole, however, it must be said that the book is disappointing. As a contribution to geographical science, it is hardly what one expects from Prof. Libbey's hand; while the eminence of one of its authors, and the scientific claim implied in many passages of it, preclude it from being regarded as a mere tourist's journal. The authors fail to make the measure of their own interest in their achievement the measure also of the reader's, and would have been better advised had they refrained from offering for public consumption much that no doubt interests their personal friends. The two volumes might easily have been compressed into one, and with advantage.

D. G. H.

POLAR REGIONS.

Antarctic Exploration.

'The Voyage of the *Discovery*.' By Captain Robert F. Scott, R.N., C.V.O. Two vols. Smith, Elder & Co. 1905.

The voyage of the *Discovery*! Never was a ship better named. Most important discoveries have been made from her during the last three years in all branches of science, as a perusal of this most interesting work will prove. No polar expedition has ever been better equipped for exploration amidst ice. None has ever been better commanded, nor has any polar chief ever had so efficient a scientific staff, or a better set of officers and men under him. To quote a phrase used by Captain Scott at the Albert Hall lecture, where seven or eight thousand people listened to him: "It was not a one-man's expedition, but one and all;" for each one of them worked as if the success of the expedition depended on himself alone, and these united efforts produced an harmonious whole, so admirably described in these volumes. They are dedicated to "Sir Clements Markham, K.C.B., F.R.S., the father of the expedition, and its most constant friend." Having been behind the scenes, I can quite confirm a remark of Sir George Goldie, that but for Sir Clements Markham there would have been no Antarctic Expedition. Sir W. Huggins, the President of the Royal Society, and the secretaries, more especially Sir A. Rücker, gave every assistance on scientific questions. I presume the instructions on those points emanated from the Royal Society, and I feel certain that that Society is as thoroughly satisfied with the results in its wide field as the Royal Geographical Society is of the work more especially its own. The travelling details were most admirably carried out. I can only regret, as I am sure every one of the *Discovery*'s officers will also regret, that Sir Leopold McClintock, the father of modern polar travelling, to whom we owe several thousands of miles of Arctic sledge-travelling, which has contributed so materially to our knowledge of the coast-line of the Arctic Regions, could not, owing to failing eyesight at eighty-four years of age, undertake this review, and as the next senior alive of the explorers of 1850–55, the duty has devolved on me. There are still five or six of

us surviving from the 1850–51 expedition, but it is even more extraordinary that in that eminent traveller, and one of the leaders of science, Sir Joseph Hooker, G.C.S.I., F.R.S., there is still a survivor of Sir James Ross's wonderful Antarctic Expedition, 1839–43. As far as the sea part of it was concerned, it was far fuller of hairbreadth escapes than even the *Discovery* met with at sea; but I doubt if the members of any expedition ever had more providential escapes on shore and over glaciers and crevasses than our latest explorers had when sledging. It was said of Sir James Ross that he was nerveless, and I think the same may be said of his successors, judging from Evans's cool expression when rescued from a most perilous position, 12 feet down a crevasse into which he and Captain Scott had fallen: "Well, I'm blowed!" (vol. 2, pp. 283, 284).

It has been truly said that England was made by its adventurers, who as a rule have lacked the wherewithal; but our merchant princes have always been munificent in finding it, and in fitting the adventurers out in a good cause. Wolstenholme sound and Cape Dudley Digges, Jones's sound, Lancaster sound, Smith sound, and other names at the head of Baffin's bay, are those of eminent London merchants of the seventeenth century. Mr. Booth at a later date, in 1830, fitted out the *Victory* under Captain (afterwards Sir John) Ross, at a cost of £17,000. His name was given to the peninsula of Boothia, at the bottom of Prince Regent inlet, and for the results of that expedition he was made a baronet. The north magnetic pole was discovered by Captain (afterwards Sir James) Ross in the *Victory's* voyage, nephew, and second in command to Sir John Ross. In 1840 he also approximately fixed the position of the south magnetic pole. Grinnel Land was named after a citizen of the United States, who equipped, at his own cost, a small expedition to assist in the search for Franklin. In recent times we have Newnes, Harmsworth, and others fitting out exploring expeditions, and the *Discovery* is no exception. Mr. Longstaff gave £25,000 towards the *Discovery* fund, and as Captain Scott justly observes, "When the *Discovery* sailed, it was to act on a concerted plan between expeditions of various nationalities. It is certain that Great Britain would not have been represented in this exploring effort had it not been for Mr. Longstaff's munificent gift. But whilst our countrymen complacently reflect that the British tradition for exploration has been maintained, they appear entirely to have forgotten the man who made it possible." He also gave £5000 towards fitting out the relief ship *Morning* in the following year, as did also Mr. Edgar Speyer. The fund collected by subscription eventually rose to the amount required, and with £92,000 in hand, the financial question was settled, and the work of equipment proceeded with. Never was money better spent, never was a better result obtained, and never was there a more readable account of work performed than is given in these volumes. Every effort was made to obtain, not only the fittest men for the work, but, as far as was possible, those who would agree with one another—a very important point. They lived, as Scott mentions, in the greatest harmony for three years. These efforts were successful. I saw much of the members of the *Discovery* Expedition when they were being *fêted* after their return. The only difference of opinion I heard was as to whether the emperor penguin or the smaller species were the best eating, and very fortunate it was that penguins and seals were so plentiful as to neutralize some of the preserved provisions that were more than suspected of being the cause of attacks of scurvy which occurred. We will briefly pass over the fitting out, except to mention that their Majesties the King and Queen honoured the *Discovery* at Cowes with a visit just before sailing on their glorious mission, which, it is almost unnecessary to say, was highly appreciated.

After a long voyage to New Zealand, they arrived at Port Lyttelton, November

29, 1901, named after the late lord of that name, who took great interest in founding the Church of England settlement of Canterbury, New Zealand. Their reception was of the warmest, from the inhabitants in general and particularly from the merchants, who supplied the expedition with many useful articles gratuitously. Subsequently the New Zealand Government granted £1000 for the relief ship.

Before following them on their perilous voyage, I will take the opportunity of stating the very great advantage this expedition had over those of my day. This advantage was the comparative youthfulness of the leader and of those under him. It was the belief of all of us, then the rising generation of 1850, that polar exploration was essentially the work of young men in full possession of their physical powers, with, of course, a fair amount of knowledge of various sciences. The leader should not be above forty years of age, and thirty-five would, as a rule, be better, except in a very few exceptional cases. To that doctrine I have always adhered, and it was carried out most strictly by Sir C. Markham, who had also always been of the same opinion. In the earlier Arctic voyages, 1818 to 1840, all the leaders were young—Parry, Franklin, both lieutenants, Richardson, a young surgeon R.N., and Back, a mate. They were all about thirty when selected for commands, and those under them were, of course, younger. The traditions of the value of youth, derived from the great war, had not departed from the Admiralty of that day, as it had a quarter of a century later, when only captains, and generally senior ones, were appointed to these commands. Even Franklin had forgotten it when the First Lord of the Admiralty objected to his sixty years of age, stating he was only fifty-nine. One of the last things we learn is the knowledge that we are growing old physically. There was much truth in our old ice-quartermaster's observation in 1850 respecting the United States expedition under Lieut. De Haven and his youthful officers, "There they goes; they knows nothing, and fears nothing." The latter quality of fearing nothing is of more value in icy exploration than the caution derived from experience of a long-past date. The most experienced whaling captain cannot foresee the rapid changes in ice-movements. So inexperience is not as heavily handicapped in the ice as elsewhere. The power of instant decision is what is required. In further support of my belief as to youth, Sir William Hewitt told me that Sir W. Meuds, flag-captain to Admiral Sir Edmund Lyons during the Crimean war, said to him, "We old heads can plan, but it is for you young men to execute."

In a brief article such as this must necessarily be, the passage from New Zealand, which was left on Christmas Eve, 1901, to the great Antarctic continent may be briefly summarized in the heading to chapter iv., vol. 1—

> "In fog and heavy weather,
> Through 'wildering sleet and snow,
> We fought the ice together
> On a track where no ships go."
>
> *Anon.*

January 4 the Antarctic circle was crossed, and the first of the pack seen—through which the explorers forced their way with varying success, as usual in pack-ice, where perseverance is generally rewarded, and they emerged from it on its southward side (see plate, p. 131) on January 8, and at 10.30 p.m. the first sight of the Antarctic continent was enjoyed. So clear was the weather that the peaks of the Admiralty range were visible at 100 geographical miles. The first sight of penguins and seals in the pack, and the first essay in eating them, caused some excitement. Little then did they anticipate how greatly they would be indebted to the same food in the time to come. "The Albatross and various oceanic

petrels" were replaced by the "blue-grey" southern fulmar, the Antarctic petrel, "the pugnacious skua gull," and the "small snowy petrel." At Cape Adare, where Sir George Newnes's expedition, of which Mr. Bernacchi was a member, wintered, the *Discovery* made a brief stay, and the explorers landed. A thousand feet above them was the grave of the only member of that expedition who died—Mr. Hanson, the naturalist. "So there rest the remains of the only human being who has found burial on this great southern continent, and above his body still stands in touching memorial a plain wooden cross." The explorers here commenced their real work, which left them little leisure during the remainder of their Antarctic stay. Most interesting is the account of their passage to the termination to the east of the "Great Ice Barrier." The account of its first being sighted and of its being seen from above in the balloon is most exciting (vol. 1, p. 163). There is a charm in being "the first that ever burst into that silent sea," but a still greater excitement in being the first civilized being that ever stood on any shore. Read! and I am sure there will be but few dissentient to the fact that those moments far more than repaid them for all their toils past, present, and future; and here again we are indebted to poetry for a brief but excellent description—

> "She skirts the icy margin of the main,
> And where, unchanging from the first of time,
> Snow swells on snow amazing to the sky,
> And icy mountains high on icy mountains piled
> Seem to the shivering sailor from afar,
> Shapeless and white, an atmosphere of cloud."
>
> THOMSON. Heading, chap. v. p. 163.

From this date, January 21, a most exciting and interesting period was passed skirting along this "Ice Barrier" till getting into winter quarters, February 9. More especially the ascent in the balloon from the summit of the ice barrier is a most interesting event. The best idea of it will be gained from the plate at p. 198. To Sir Joseph Hooker the expedition was indebted for the idea of the balloon, and special funds had to be raised for it, as it was not in the original programme. The experience gained justified the expense; the allowance of gas, 500 cubic feet, was given to it, but it required another 100 feet in that climate to inflate the balloon properly. The temperature is not given. It was probably 15° to 20° below freezing-point of Fahrenheit. Captain Scott is the first Antarctic aeronaut, and Mr. Shackleton the second. The latter took photographs of the ice from the height to which the balloon raised him.

The winter quarters were only a few miles distant from Mou[illegible]s Erebus and Terror, the former being, as in Ross's time, sixty-five years previously, in an active state, and from its summit, 14,000 feet above the sea, a correct idea of the prevailing wind at that height was obtained by watching the smoke issuing from the crater. Had an eruption like that of Vesuvius occurred, future New Zealanders might puzzle as to the remains found under the ashes and lava. As it happened, the winter quarters were in a very good position for the various duties of the expedition—scientific or travelling, etc. From the hardships of the autumn travelling and various mishaps the one want of the expedition—experience—was supplied, in the case of Vince, alas! by the loss of one precious life; nor could the body be discovered after a very active search (vol. 1, p. 233). Fortunately, they were enabled to lay in a good supply of seal and penguins to diversify their diet during the long winter of 128 days without seeing the sun. The sunsets in the autumn of the departing sun, and its twilight after its departure, were equally glorious. Their various methods of passing the time, and the rapidity with which

it passed, judging from my own experience of three Arctic winters, made their Antarctic winter seem to explorers a period which will be regarded by them hereafter "as halcyon days." This will always be the case when there is no lack of diversified occupation, and a keen enthusiasm in preparing for the work of the spring.

A very interesting portion of this book is devoted to the account of the sledge-travelling operations, which were of a different nature from those of the naval Arctic expeditions. The only land we travelled over was Melville island, which was at first harder work than any ice-travelling, owing to the quantity of ground bare of snow over which sledges could not be dragged. They had to be unloaded, and portages made, as Scott had to do when his dogs broke down; but, as knowledge is power, the week of crossing Melville island was reduced to 2½ days on the return by the fortunate discovery of a ravine and a route with very little ground clear of snow. Scott, in a similar way, profited by Armitage's experience of a 27-day route, which Scott reduced to 6. There can never be any comparison of the work done by various expeditions under very different circumstances, and "to make marching records," as Scott observes, is not our work. I very much doubt, however, if Scott's marches, with his small means, will ever be beaten. His southern journey is a splendid example of what can be done by three officers, one of whom broke down from scurvy on the return journey when three weeks from the ship. Captain Scott and Dr. Wilson, the other two members of the party, were also suffering from that debilitating complaint to a lesser extent, and when nearing the ship, Scott observes, "on every side we have suggestions of home. That it is none too soon is evident. We are as nearly spent as three persons can well be." They were 93 days away, and did 960 statute miles; and I have no hesitation in saying that had the party consisted of six men and no dogs, it would have achieved far greater results. If others do not concur with me, all will agree in the wind-up of chaps. i. and ii., vol. 2. "If we had not achieved such great results as at one time we had hoped for, we knew at least we had striven and endured with all our might," and the same might be said of each and every one in the *Discovery*. Each and all realized (as Farragut said of his second in command in one of his battles) the spirit of one of Collingwood's best sayings, "not to be afraid of doing too much. Those who are seldom do as much as they ought." In the second travelling season Scott was away 59 days at a time, 9 being spent in their tents, confined by blizzards and snowstorms, and the distance accomplished was 725 miles, an average of 14·5 each marching day at an altitude of 9000 feet, the highest ever attained in Polar Regions. In this journey they had several hair-breadth and providential escapes. Captain Scott remarks that, "Taking the 81 days of absence on sledging, I found that Evans, Lashly [his two companions], and I had covered 1098 miles, at an average of 15·4 per day [statute miles], or 13·6 geographical miles.

In this journey the party had, as already mentioned, some wonderful escapes, accounts of which would be too long to give here. In one, however, when tramping along merrily, Scott and Evans stepped on nothing and disappeared from Lashly's view down a crevasse. Fortunately, they were rescued from this peril. When Scott got to the surface, Lashly said, "Thank God!" and when Evans was rescued, he said, "Well, I'm blowed!" "the first sign of astonishment he had shown." But astonishment was afterwards expressed, "Well, sir, what about that snow bridge?" "If so and so had not happened, where should we be now?" "My word, but it was a close call!" This miraculous escape did not appear to have affected their nerves.

The two volumes are a mine of wealth to future Hentys, Stevensons, and other

writers for boys. Captain Scott may well wind up the travelling results in the following words: "We may claim, therefore, to have accomplished a creditable" [far too mild an expression] "journey under the hardest conditions on record," and he adds the hope that his future wanderings will never again lead him to the summit of Victoria Land" [at a height of 9000 feet]. It is curious that the skeleton of a seal was found 5000 feet above sea-level, and another was found lower down. It is also worthy of remark that the Antarctic seal and the penguin feel in much greater security on the ice than in the water, and consequently there was no difficulty in killing them. In the Arctic Regions the reverse is the case. A seal on the ice is quite on the alert, for there he is at the mercy of the prowling bear if surprised, while in the water he is secure from the bear or any sea monster. It requires very skilful hunting to catch him asleep on the floe in the Arctic seas.

Captain Scott, on his return, found the sledging resources of the ship had been utilized to the fullest extent, "and parties had been constantly going, ever adding something to the knowledge of our surroundings," mostly for scientific purposes. Lieut. Armitage occupied 52 days, and, at great risk and danger, was the first to ascend to the central plateau to a height of 9000 feet above the sea. The party were 37 days on the outward trip to ascend this height, but only 15 returning. One accident occurred to Armitage, who reports, "We descended the upper fall with ease, and while crossing the smooth ice at their feet . . . I suddenly became conscious I was taking a dive; then I felt a violent blow on my right side, and all the breath seemed to be shaken out of my body. Instinctively I thrust out my knees and elbows, and then I saw I was some little way down a crevasse. It was about 4 feet wide where I was, but broadened out to the right and left of me; below it widened into a huge fathomless cavern. Skelton sang out that my harness had held, and threw down the alpine rope with a bowline in it. I slipped this over my shoulders, and was hauled up with a series of jerks and landed on the surface, feeling rather as though I had been cut in two, with not a gasp left in me. I was let down about 12 feet." This was almost as marvellous an escape as that already mentioned of Captain Scott and Evans. The result of this journey was very useful to Captain Scott in his western journey on the upper plateau next year, when he also attained 9000 feet above sea-level; it enabled him, by trying a different route, to reach the point of starting for his plateau 27 days to 66. These western journeys proved, as far as they went, that the upper plateau of Victoria Land was a fairly level plateau 9000 feet above the sea. There were other comparatively long journeys. Lieut. Royds and Mr. Bernacchi made a journey of 260 miles over the continuation to the south of the "Icy Barrier," which occupied 30 days, and proved the ice over which he travelled was a plain, as did Captain Scott in his southern journey. Mr. Bernacchi on this journey made a valuable series of magnetic observations. Lieut. Barne also did very excellent work during the exploration, in laying out a depôt for Captain Scott's long journey, and, with Lieut. Mulock, did valuable work in surveying the coast up to 80° S. lat., encountering many difficulties.

The table on the chart shows the extent and duration of travelling done by each party. Those of the scientific department were more for scientific researches into the structure of the land glaciers, etc., than for geographical discovery.

Some of the remarks of the men are amusing. Lashly observed, on seeing mud at the foot of a glacier, "What a splendid place for growing spuds!"

Amongst other curiosities, Dr. Wilson found "calcareous growth in seals' hearts, and concluded they suffered from gout." The Primus cooking apparatus was a great improvement on ours, enabling them to have hot lunches, instead of cold, as we had, and their afternoon marches were the longest. Experience taught us six

hours before lunch and four after it were the best. The sledgeometer was a great check on overrating distances so common in Arctic travelling. These volumes are not only instructive, but most interesting, which is not the case with all works of travel.

Scott observes, "On the whole the displays of the Aurora Australis have been disappointing. We had expected them to be more brilliant." In returning from the Arctic Regions, the displays of the Aurora Borealis were much finer when crossing the Atlantic in lat. 60° to 56° N., and were much more brilliant than at our winter quarters in lat. 74° N. The finest one I ever saw was at the mouth of the Humber, our first anchorage in returning in September, 1851. I forget the exact date. There it was, a circle of rose-coloured light, and two columns. In London it was so vivid the fire-engines were on the move while it lasted during the night.

With more time and space, there are other points which might be touched on. It is evident some of the food was not as satisfactory as it ought to have been, as is shown by one of the witticisms of a nigger minstrel, who, in reply to "Which is the quickest way to clear the lower deck of the *Discovery*?" said, "You take and open a tin of ——'s Brussels sprouts."

The condition of food bought in New Zealand, etc., was more satisfactory than some of that brought from England. The food of travelling parties, and the semi-starvation and scurvy in them, appear to require scientific investigation.

There cannot be a better wind-up to this article than by calling attention to the admirable work of the relief ship *Morning*, under her very able commander Colbeck.

R. Vesey Hamilton.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Routes and Social Types.

'Les Grandes Routes des Peuples, Essai de Géographie Sociale. Comment la route crée le type social.' By Edmond Demolins. 2 vols. (i. Les Routes de l'Antiquité; ii. Les Routes du Monde Moderne). Paris: Firmin Didot. 1903.

These two interesting and suggestive volumes are devoted to an exposition of a remarkable theory, "La cause première et décisive de la diversité des peuples et de la diversité des races, c'est la route que les peuples ont suivie. C'est la route qui crée la race et qui crée le type social." The routes followed by the great races of mankind, in the author's view, have acted like powerful alembics, transforming human nature with the same inevitableness as certain metals are transformed by chemical agency. Insensibly, unavoidably, the routes of the steppes, of the tundras, of the savannas, of the tropical forests, have worked out the types of Tartar-Mongol, of Lapp-Esquimaux, of Red Skin, of Indian, or of Negro humanity. Everywhere the route, the line of march followed in racial migration, has imprinted upon mankind its own mark, with fatal and rigorous exactitude. The diversity of these routes alone explains the diversity of Western nations and what is commonly called the distinctions of national genius. If the routes change, the nation changes, the race alters: everywhere the same routes reproduce the same social types, and impose on those who follow them the same essential characteristics. From this conception, M. Demolins believes, geography and history acquire fresh value: the former now begins to explain the nature and social functions of the various great routes, and consequently the origin of the various great races of mankind; the latter rises to the position of the highest and most exact philosophy, showing us how natural conditions are fulfilled in time.

Essentially, the present study is an essay in social science viewed from a number of historical and geographical standpoints, and it is to social science journals that its proper discussion must be referred. But it may be said, that even if we think the author prone at times to bend facts of history and geography to his purpose, and even if we regard his theory as failing to explain a very large part of the field which he surveys, yet in these volumes we must recognize material and treatment of a highly stimulating character, not least suggestive where one most strongly disagrees with the conclusions.

C. R. B.

Travels of Rabbi Benjamin.

'Die Reisebeschreibungen des R. Benjamin von Toledo von Dr. L. Grünhut und Markus N. Adler.' Jerusalem (Frankfurt a. M.): 1903.

This edition of the great Jewish traveller of the twelfth century, comprising the Hebrew text, with notes (Part i. pp. 1–164), a German version of the revised original (Part ii. pp. 1–96), an introduction of twenty-four pages, and two sketch-maps (i. of Syria and Palestine; ii. of the "lands of exile," viz. Mesopotamia and Western Persia), both of somewhat inadequate character, claims to have been prepared from a fresh examination of three manuscripts of the thirteenth and fourteenth centuries, and to be no mere reissue of Asher. This claim appears well substantiated: Dr. Grünhut and his colleague have certainly produced a conscientious and serviceable work, especially in its critical parts; their commentary on the subject-matter is of slenderer character, and cannot pretend for a moment to supersede Asher's, or to give us more than a certain number of addenda and corrigenda to the edition of 1840–1. Even here, however, the student will find some useful hints, especially for the identification of personal and place-names in the narrative. In the Introduction an account is given of some of the chief manuscripts and editions; various criticisms of Rabbi Benjamin, especially those coming from R. Jacob Saphir, are considered and refuted; and particular attention is given to the questions of the date, purpose, and exact course, of Benjamin's journey. The number of missprints, omissions, and other matters corrected by errata and additamenta, is unfortunately large (Part ii. pp. 97–99), and the index is, still more unfortunately, small, even to the vanishing point.

C. R. B.

THE MONTHLY RECORD.

EUROPE.

The Island of Ictis.—Mr. Clement Reid, of the Geological Survey, lately read a paper before the Society of Antiquaries on the subject of the island of Ictis (or Mictis), referred to by Timæus, Diodorus Siculus, and Pliny in connection with the ancient tin trade with Britain, the identification of which, in a way that would harmonize with the statements of the writers in question, has always been a matter of some difficulty. The paper has been printed in *Archæologia* (vol. 59, 1905), and also issued separately as a reprint. Mr. Reid approaches the question with unusual qualifications for its solution, as much depends on a correct knowledge of the physical changes which have taken place on the south coast of Great Britain since the beginning of our era. An obvious interpretation is that which identifies Ictis with Vectis, the name of the Isle of Wight in Roman times. But in this case the difficulty has been to explain the statement by Diodorus

Siculus that the tin was carried in waggons from the mainland to the island by a passage which was dry at ebb-tide, though covered at the flood. This historian considers this a general characteristic of the islands between Europe and Britain, but while this would seem to be an incorrect generalization, Mr. Reid thinks that the author was quite right as regards the only island on the trade route described, which in his view really was the Isle of Wight. He points out that the strata east of Yarmouth form a basin or syncline, at the bottom of which lies the Bembridge limestone, a rock which can form extensive pavement-like ledges on the foreshore. The basin is now incomplete, having been cut away in the west by the Solent; but it was evidently once continuous, and if the geological map be completed so as to show the state of things at a time when the limestone still rose to sea-level throughout, it is found that the loop of rocky ledges must have reached the mainland coast of 2000 years ago, this having since receded a considerable distance through the action of the sea. A sketch-map is given showing the probable contours of the coast about 100 B.C., with the band of hard limestone connecting the island with the mainland and forming a causeway such as is hinted at by Diodorus Siculus. Everywhere else the bottom would be soft clay or loose sand, making it impossible to take carts across even were the water shoal enough. To meet the objection that the ancient valley of the Solent (which in late Pliocene times had as headstreams the modern Frome and Avon) must have isolated the Isle of Wight long before Roman times, Mr. Reid points out that after the inroads of the sea first cut off the headstreams of this river system, a divide would gradually be formed towards the east across the modern Solent, and that its position would be determined by the same belt of hard limestone which, after the level of the valleys had been further lowered, became the causeway used in the tin trade.

The Scottish Peat Mosses.—An interesting study of some of the Scottish peat mosses has been carried out by Mr. F. J. Lewis, of Liverpool University, who is already known to readers of the *Journal* for his researches on the botanical geography of the north of England (vol. **23**, p. 313; vol. **24**, p. 267). The results of the first part of his work, which was concerned with the mosses of the southern uplands of Scotland, have been described by Mr. Lewis in the *Transactions of the Royal Society of Edinburgh* (vol. **41**, part iii., 1905). The special value of the investigation lies in the care bestowed on the elucidation of the *succession* of plant remains in the mosses, a knowledge of which is more likely to throw light on problems of geological history than the mere record of plants occurring over wide areas. The data were obtained both by borings and sections, the former made with a 2½-inch clay auger with rods to bore to 20 feet; the latter generally in the form of a pit varying in length from 8 to 16 feet, according to the depth to be reached (16 to 17 feet in some cases). The areas examined in 1904 were: (1) The upland mosses between the Merrick and Kells ranges in Kirkcudbright and Ayr; (2) upland mosses in the Tweedsmuir district in Selkirk; (3) hilltop peat of the Moorfoot hills in Peebles and Edinburgh; (4) lowland mosses in Wigton; (5) buried peat in the Earn valley; (6) mosses resting on the 25-feet raised beach of the south coast. The sections obtained in each of these are described in detail, the general conclusions being as follows. The peat in all the districts shows a definite stratification of plant-remains, indicating a swing from woodland to heath and moss, and again to woodland. Such alternations cannot have been due, in the hill districts under discussion, to mere changes in drainage caused by the throwing up of a clay or sand bank (suggested by Dr. Gunnar Andersson as the determining factor in the case of areas in Sweden), but seem the result of climatic changes extending over wide areas. The sections shown by the Merrick and Kells

mosses, and by those in the Tweedsmuir district, are in very close agreement. They occur above and upon the moraines of the local ice-sheets and glaciers of the southern uplands (belonging to the "third" epoch of glaciation), and must therefore be of later date; while the presence at their base of woodland (*Betula*, etc., found at the base of all the Scottish mosses examined) suggests that they did not originate until a temperate climate had replaced the glacial conditions. A return to colder conditions, severe enough to cause considerable glaciation in the highlands, is indicated in both districts by a bed of Arctic plants (*Empetrum* with *Salix herbacea* and *reticulata*). This would seem to represent the "fourth" glacial period—that of the mountain valley glaciers, when the snow-line stood at 2500 feet. Higher up again there is a well-defined woodland bed, defined by *Pinus sylvestris* in the one district, and by *Betula alba* in the other, but this dies out upwards, apparently indicating a return to colder and wetter conditions, marked by the growth of *Sphagnum*—the typical plant in the bulk of the sections. In the Moorfoot hills there are widespread forest beds, and no decidedly Arctic vegetation, though a colder period may be indicated by a zone of *Empetrum* with *Arctostaphylos*. The lowland mosses of Wigtonshire occupy large badly drained hollows in the till, and seem the only ones in which peat is forming at the present day. Lastly, the mosses lying on the 25-feet raised beaches contain no Arctic plants, but their vegetation agrees generally with that in the *upper* layers of the older mosses inland.

Roman Itineraries in France.—An article by M. A. Blarquez on the "Roman Roads in France" appears in the *Comptes Rendus* of the National Congress of French Geographical Societies (Session XXIV., 1903: Rouen, 1904). The writer shows how the length of the Roman mile differed in different parts of the empire. The following itinerary from Reims to Metz by way of Verdun is first cited:—

"A Durocorturo Divodurum—

Usque	mpm.	LXII.
Basilia	„	X.
Axuenna...	„	XII.
Virodunum	„	XVII.
Fines	„	IX.
Ibliodurum	„	VI.
Divodurum	„	VIII."

Now the actual distances from Durocorturum (Reims) to Axuenna (Aisne) is 55 kilom.; thence to Virodunum (Verdun), 42 kilom.; thence to Divodurum (Metz) 58; altogether 155 kilom. If, then, we divide the respective numbers of kilometres by the corresponding numbers in the above itinerary, the result in all cases closely approximates to 2500 metres, or 1·55 English miles, which gives us the length of the Roman mile. The next itinerary cited is from Reims to Metz by way of Tullum (Toul):—

"Usque	mpm.	LXXXVI.
Fanum Minervæ	„	XIV.
Ariola	„	XVI.
Caturigas	„	IX.
Tullum	„	XVI.
Scarpona	„	X.
Divodurum...	„	XII."

The site of Fanum Minervæ is, in the author's opinion, a hill 2 kilom. to the north of Dampierre-du-Temple. Ariola the author would not place at Vroil, but

not far from it in the environs of the Viere river. From this second table, too, by a process similar to the above, the Roman mile again works out at 2500 metres, or 1·55 English mile. In other itineraries, however, the mile is found to be sometimes 1666 metres (5466 feet) long. The following are the conclusions at which the author arrives: (1) Some Roman roads in the itinerary have for unit of measurement a league of 2500 metres; (2) in others the distance is expressed in miles of 1666 metres, the mile and a half in such cases corresponding to the league; (3) there are roads the distances on which are expressed sometimes in miles, sometimes in leagues; (4) there are roads the distances on which are measured sometimes by leagues of 2222 metres (the Italian mile and a half), sometimes by leagues of 2500 metres; (5) on the road from Frejus (?) to Arles some distances seem to have been measured by miles approximately 1300 metres long. The article is marred by a number of misprints, which sometimes render the identification of the place-names a matter of difficulty.

Ancient Navigation of the Garonne.—The *Comptes Rendus* of the Congress of French Geographical Societies in 1903 (Rouen, 1904) contain an article of much interest by M. Guénot, on the navigation of the Garonne. So feeble, owing to the results of deforestation, is now the current of the Garonne between Toulouse and Agen, that many would discredit the notion of its ever having been navigated by merchant craft. Yet before the Roman conquest of Gaul the Garonne was much thronged by Gaulish boats. The site of Toulouse was chosen for the sake of navigation. The centre of a great pottery industry, the floor of the ancient town, a few yards underground, is strewn with amphoræ, broken and whole. Thanks to the river, the *Figlinæ* had dealings throughout the greater part of the country between the two seas. The amphora was used as a unit of measure. A boat was of 200, 500, 1000 amphoræ. At Tolosa four deniers per amphora was imposed on merchants in the year of Rome 678. The Garonne was the principal part of a brisk commercial route from Rome to Arles, Narbonne, and Bordeaux. At Toulouse merchandise was transferred from land to water carriage, and *vice-versâ*. By the rivers were carried wood, marble, and the stone of the Pyrenees for the construction of cities and Gallo-Roman villas. Narbonne and all the riparian towns had ports, and these, again, had merchant companies, and among such companies there was a comprehensive union. There were separate unions of *Scapharii* and *Tricularii*. Strabo testifies how "the rivers of Gaul offered and still offer convenient routes of traffic, for, thanks to the favour of Nature, such is their correspondence that, after a short land journey, people pass to and fro from sea to sea by water." No less interesting is the history of the part played by the Garonne in the commerce of Europe, and ultimately the whole known world from the time of the invasion of the barbarians down into the eighteenth century. In one voyage in 1268 the monks of Granada transported 40 tons of wheat, 120 tons of wine, 8 hogsheads of salt, 21 cwts. of copper and tin, wood, cloth, and lead. On the return voyage they brought 6000 herrings and 2000 cod. The boats rowed down and towed up. The article includes curious and illustrative citations from letters patent of Henry II., contracts, and other documents.

The Temple of Serapis.—It is stated in the *Rivista Geografica Italiana* for October last (p. 497) that a connection of the Temple of Serapis near Pozzuoli with the general network of the Italian precise levelling, was carried out last summer by the Istituto Geografico Militare. This will afford the means of exactly determining the amount of future fluctuations of level at this classical spot.

Exploration in the Northern Urals.—Prof. Duparc, who, with his colleague Prof. Pearce (both of Geneva University), has lately continued his fruitful researches into the physical geography and geology of the Urals, has communicated

to the November number of *La Géographie* a short note on the results of last summer's journey. He remarks that, if the vegetation of the Northern Urals be left out of view, and the lighting and tones modified somewhat, one may well imagine one's self in some Colorado landscape. It is surprising, he says, that this analogy has escaped the few Russian travellers who have visited the region, and have found there indications of glacial phenomena, which in reality do not exist. The journey, which was particularly instructive, led past the sources of the Vichera (which were carefully examined) into the basin of the Pechora, where, however, the sudden approach of cold weather prevented further work. The data collected will permit of the preparation of a map of the whole region of the Vichera, Sosva, Vagran, Kakva, and Kosva rivers, while Prof. Duparc also promises a general sketch of the geophysical and geographical features of the Northern Urals.

ASIA.

French Expeditions in Eastern and Central Asia.—News has been received in France of the death of Lieut. Grillières, a French traveller of much promise who became known some two years ago for an enterprising journey on the borders of Yunnan and Tibet. He had lately started on a new expedition towards the same region, and had successfully passed through northern Siam and the Shan States *en route* for Yunnan-fu, when he succumbed to an attack of fever at Semao. Another French traveller, Mr. Comby, has made his way to Yunnan by way of the Red river, paying attention to the ethnography of the regions traversed, and making natural history collections. A still more extensive journey is planned by M. Pelliot, who is about to start for Central Asia under the auspices of the *Académie des Inscriptions et Belles Lettres*, of the Minister of Public Instruction, and of the Paris Geographical Society. Its objects will be primarily archæological, and it is proposed to traverse Chinese Turkestan and Northern Tibet in a generally west-and-east direction, finishing the journey at Peking at the end of some two years. M. Pelliot is professor of Chinese at the Ecole Française d'Etrême-Orient at Hanoi, and his linguistic competence should stand him in good stead in the researches he hopes to carry out. They will be directed, according to the *Bulletin du Comité de l'Asie Française* (October, 1905), principally to an examination of the ruins, and particularly the inscriptions, dating from the period when Chinese Turkestan was subject to Turco-Buddhist dynasties, during the early centuries of our era. This paper states that M. Pelliot is going out under the auspices of the French branch of an International Association founded in Russia for the exploration of Central Asia and the Far East, while the supporting bodies are given as above in the November number of *La Géographie*.

Journey across Southern Borneo.—It is stated in the *Deutsche Kolonialzeitung* for October 7 last that a crossing of Southern Borneo from Banjermassin to Pontianah, through the primeval forests of the centre of the island, has been effected by Lieut. Messemaekers van der Graaf, with a force of a hundred men. Two months were taken on the journey.

AFRICA.

M. Villatte's Journey in the Central Sahara.—M. Villatte's account of his journey from Tidikelt to Adrar and back, in company with Colonel Laperrine (*La Géographie*, October, 1905), to which reference was made in the December number, supplies a detailed description of the country along the routes followed, with much information on the geological structure, conditions of vegetation and

climate, and other features, which is particularly acceptable by reason of the indefinite nature of our previous knowledge of this part of the desert. Although traversed in parts by Major Laing in 1826, it had never since been crossed by a European expedition, while the loss of Major Laing's journal after his murder near Timbuktu robbed us of the geographical information that might otherwise have resulted from his journey. The expedition set out from Akabli, south-west of Insalah, on March 14, 1904, and the route led in a generally southern direction to the mountainous region of Adrar in about 20° N. It crossed various expanses of "reg," or hard stony plains, with occasional stretches of dunes, as well as some more elevated plateaux, while mountain *massifs* of some importance were seen on either side of the route, including the Adrar Ahenet to the east. The geological formation was for some distance a sandstone of Devonian age (as shown by the fossils found in several localities), which formed an extensive plateau some 600 to 1000 feet higher than the "reg." Pasturage and other vegetation were occasionally seen in some luxuriance, and no difficulty seems to have been experienced in the matter of water-supply. At Inzize the watering-place is a pool difficult of access, as it occupies a crater-like depression shut in by rhyolite cliffs 500 to 600 feet high. The Devonian plateau had been left behind at about 24° 30′ N. (though traces of the same formation are occasionally seen to the south of this), and the geological formation was thenceforth Archæan. The route entered the barren gravel desert of the Tanezruft, a term which has acquired among the Arabs a more or less generic significance, denoting any level tract devoid of vegetation. The great Tanezruft here mentioned itself consists of three parts, a more broken country to the north and south being included under the same general designation with the true gravel desert between Takhamalt and Timissao. On reaching northern Adrar a complete transformation takes place, the vegetation becoming more luxuriant and the fauna more rich, while a change in the climatic conditions is very apparent. Both here and during the return journey an overcast condition of the sky prevailed, accompanied by a humid atmosphere and violent storms of wind and rain at irregular intervals. Coupled with the heat, the humidity proved very trying. After meeting the detachment from Timbuktu under Captain Théveniaut, Colonel Laperrine's force set out on the return march by a more easterly route, the general features of which are thus summarized by M. Villatte. The region of Tin Ghaor forms a triangle between the Hoggar, Adrar, and Air. Its surface is fairly broken, and bears, among other elevations, a Devonian plateau, the Tassili Tin Ghaor. The way afterwards drops into a "Tanezruft," which continues as far as Tinef, where the mountainous tract of the Tahalghar, between the Wed Abalessa and the Hoggar, begins. The expedition skirted the western outliers of the great Hoggar *massif*, and afterwards passed along the foot of the Tifedest, another elevated *massif* further north. Throughout this part of the journey numerous weds, descending from the eastern highlands, were crossed, and cultivation of wheat, barley, and vegetables was noticed at several places. The principal settlement on this route is Abalessa, just south of 23°. Besides the formations above alluded to, volcanic masses were frequently seen superimposed on the Archæan peneplain. M. Vilatte's map is based on careful astronomical observations, and will form a valuable basis for the future cartography of this region.

Return of M. Gautier.—M. Gautier, whose successful journey across the Sahara was recorded in the December number of the *Journal*, has now returned to France, and further details respecting his route have been communicated to the Paris Geographical Society (*La Géographie*, November 15, 1905). M. Gautier left Taurirt, in southern Tuat, in company with Lieut. Mussel and M. Chudeau, the former of whom was commissioned to survey the hitherto untraversed route to

the south *viâ* Wallen. The small party traversed the *massif* of Asejra, which had previously been seen from a distance only, and then made its way to the Adrar Ahnet, where it was joined by M. Etiennot and his escort under Captain Dinaux. After a halt for the purpose of getting the camels into condition for the passage of the Tanezruft, the march was resumed by way of Inzize and Timissao (also on Colonel Laperrine's and M. Villattes's route of the previous year) to the "Adrar of the Iforas." Here the other Europeans turned northwards, while M. Gautier proceeded to Gao on the Niger under native escort only. M. Chudeau was, meanwhile, to explore the Hoggar *massif*, and thence proceed to Air and Zinder, whither it is expected that he has already arrived. M. Gautier lays stress on the ease with which peaceable travellers can now traverse the Sahara in all directions.

Geographical Work in French Africa.—The November number of *La Géographie* refers to several pieces of work which will add to our knowledge of the geography of the French African territories. On the lower Senegal, surveys have been carried out on a geodetic basis with a view to supplying a more accurate map than has hitherto been in existence, and of this the first two sheets have already been issued. This is only part of a general scheme for the survey and mapping of the French West African territories, to be proceeded with as opportunity offers. Maps have also been prepared giving the results of the expedition of M. Chevalier to the south-east of Lake Chad. They are the work of M. Courtet, a member of the expedition, and pay special attention to the economic possibilities of the region, the distribution of modes of cultivation being carefully marked. The same number contains an important paper, by Lieut. Audoin, on the hydrography of Lake Chad, which will be noticed at length in a subsequent number of the *Journal*. The French boundary with the Kamerun is at last to be delimited on the spot, the work on the eastern and southern frontiers being entrusted to two distinct commissions, which have already started for the West Coast. The French sections are under the charge of Commandant Moll and Captain Cottes respectively. An outline is also given of survey and other work accomplished in Madagascar in 1904, based on a recent report of General Gallieni.

Mr. W. A. Cunnington's Expedition to Lake Tanganyika.—We have received from Prof. Ray Lancaster the report of the third expedition for biological research despatched to Central Africa under the auspices of the Tanganyika Exploration Committee. As has already been mentioned in the *Journal*, the expedition was placed in charge of Mr. W. A. Cunnington of Cambridge, who left London on March 24, 1904, and returned in June, 1905. The time spent on and around Tanganyika was about eight months, during which time the collection of the fauna and flora of the lake was vigorously prosecuted, as well as observations of temperature and of alterations in water-level. The former seems in general very high, the lowest obtained being 73°·3 Fahr., the highest 81°. At a depth of 76 fathoms (the length of the sounding-line) the temperature appears fairly constant, all the readings varying only between 74°·1 and 74°·8. The return route adopted was by the Victoria Nyanza (on which lake collections, including a species of prawn and a sponge, were also made), Uganda, and Zanzibar. Between Tanganyika and Bukoba, on the Victoria lake, progress was delayed by bad weather and by the famine-stricken nature of the country traversed. The report does not discuss the conclusions relative to the past history of Tanganyika arrived at by Mr. Cunnington, but we understand that they are opposed to the views of Mr. J. E. S. Moore.

Captain Lemaire's Surveys in the Lado Region.—The well-known Belgian explorer, Captain Lemaire, has returned to Europe after a three years'

absence, during which he has carried out important surveys and geographica studies in the extreme north-east of the Congo State, principally in the Lado enclave. The return journey was made *viâ* the Nile.

The Sebu River, Morocco.—We learn from the *Dépêche Coloniale* for November 11 last, that a French expedition under Dr. Samné has lately made a careful examination of the Sebu river with a view to its capabilities for navigation. The result is said to have been very satisfactory, it having been proved that the river is navigable for shallow-draught boats for a distance of some 125 miles from its mouth, and that, except at very low water, navigation would be possible as far as Fez. It is thought that the river may become of great importance as a route to the interior, and that towns will spring up in its valley, which is likely to become the granary of Morocco. The possibility of establishing a port at the mouth of the Sebu is discussed by Dr. Samné in the issue of the same paper for November 16, which contains a sketch-map. The writer insists on the great advantages as regards position possessed by Mehdiya, on the left bank of the embouchure, a town which has a history dating back even, it is said, to the time of the Phœnicians. The bar which obstructs the mouth of the river is the only drawback, but this does not seem insuperable. An examination of the Sebu mouth has also been made by Lieut. Dyé, well known for the part which he took in the Marchand expedition across Africa, who has lately carried out hydrographical surveys on the west coast of Morocco.

NORTH AMERICA.

The Sierra Madre of Mexico.—In the *Journal* for August last (p. 218) reference was made to a scientific expedition to the western Sierra Madre, carried out by Dr. E. O. Hovey and Prof. R. T. Hill early in 1905. Dr. Hovey has since sketched the physical features of the region visited, as elucidated by his own and Prof. Hill's observations, in the *Bulletin* of the American Geographical Society for September last. The first part of the journey gave an insight into the origin of the stratified beds of the "mesa" or desert formations of this part of North America, which has given rise to so much discussion, and which is explained by Dr. Hovey thus. Under the influence of the great diurnal changes of temperature on the elevated plateau, the volcanic components crack and disintegrate, the fragments becoming smaller as they descend the slopes, and so coming within the transporting power of the heavy winds which often prevail. The material is rapidly carried into the basins which lie between the numerous old centres of eruption and gradually fills them. Temporary ponds are also formed in the depressions, and act like settling tanks—a term suggested by Prof. Hill—with the result that well-stratified beds originate within the wind-drift areas and between beds showing little or no stratification. This explains the occurrence of some of the lenticular deposits of adobe clay found in the mesas. Most of the streams derived from the copious drainage of the high plateaus of this region either dry up in the desert or flow into lakes without outlet. The Conchos, however, a tributary of the Rio Grande, is slowly working back into the high plateau from the east, while the Yaqui and its branches and other Pacific rivers are cutting into it from the west with greater rapidity. Lake Guzman is one of the largest of the desert lakes, but is subject to active evaporation, and is reported to have entirely dried up in August, 1904. Its principal feeder is the Corralitos or Casas Grandes river, of which the principal headstream is the San Miguel, which has cut itself a narrow deep gorge in a well-dissected plain rising gradually to the cliffs forming the upper and outer cañon, the whole depth being 1800 feet. The principal rocks exposed are rhyolite flows and tuffs, but basalt and andesite also occur. From Casas

Grandes to the Yaqui the rocks are almost exclusively volcanic, with local deposits of sandstone and conglomerates derived directly from the former. The great plateau (about 6500 feet above sea-level) is a constructional plain formed by the upper surface of the rhyolite flows. Much of the drainage is still independent, and none of the water falling on this portion reaches either ocean, though a part has been captured by the San Miguel. The mountains rise only from 1500 to 2500 feet above the mesa, which itself gradually rises to the south, until the almost imperceptible continental divide is reached. The great cañon of the Yaqui, on the Pacific side (long the scene of extensive mining operations), is described as rivalling the Grand Cañon of the Colorado. The river is from 4500 to 5000 feet below the highest points of the rim, and from one point nineteen superimposed flows of lava may be traced. The mesa has here a gentle dip to the east and south, and the smaller streams still preserve a "consequent" course to the south-east, but the Yaqui and others of the principal streams pursue an inverted course to the west. In this direction the dissection of the mesas has proceeded farther, and their tops are less extensive than further east. South of the Yaqui is the V-shaped cañon of the Mayo, where a striking development of a dark blue conglomerate was observed.

Mineral Resources of Alaska.—A recent official report, illustrated by maps and diagrams, on the Alaskan work of the U.S. Geological Survey, gives summary estimates by the surveying parties, fourteen in all, made during last year's summer survey, of the economic mineral resources of various parts of the territory. Topographic reconnaissance surveys (1 : 250,000) were made over some 4000 square miles in the Yukon-Tanana region, and over 1500 square miles in Cook inlet placer district, and a detailed map (1 : 4500) made of 600 miles near Nome. A geological reconnaissance was further made of parts of south-east Alaska; the investigation of Fairbanks and Rampart districts and of Seward peninsula followed up; and other work of scientific importance prosecuted. In accordance, however, with the purpose of the report to serve the clamant interests of miners and prospectors, much the greater part is occupied with placer mines, the main source of the treasure drawn from Alaska. The entire product of Alaskan gold placers in 1904, reckoned on the basis of estimates by the Director of Mints, and exclusive of $3,000,000 from lode mines, amounted to $6,000,000—double the amount of 1899, but only $250,000 over the yield of 1903. The report looks forward to an annual yield from placer mines double the amount of 1904 within the next decade. In south-east Alaska the mineral deposits of Sitka, of Admiralty island, and of a belt on the mainland were examined, and a supplementary study made of the principal ores of the Ketchikan district. The total gold product of south-east Alaska for 1904 is estimated at $275,000, exclusive of $3,000,000 from the Treadwell mines. Its silver production is estimated at $30,000; while, except for small shipments for smelter tests, the copper yield has been *nil*. A full report of a supplementary examination of the coal and oil fields of Controller bay region is now in press. The gold drawn from the Cape Yaktag placers in 1904 is estimated at $10,000 to $15,000. A report on the gold placers of Turnagain arm (Cook inlet) mentions that this is notable for its high tides, beginning with a bore 6 feet high at times, and running in from the inlet at a speed of 5 or 6 miles an hour. Small steamers enter and leave at high water. Coal of a very high grade, such as may soon compete with the Pacific Coast bituminous coals, has been found at Controller bay. The coal product of south-west Alaska down to date is estimated at 10,000 tons.

AUSTRALASIA AND PACIFIC ISLANDS.

Magnetic Survey of the North Pacific Ocean.—In a recent communication to *Terrestrial Magnetism*, Prof. L. A. Bauer gives some account of the inauguration of the magnetic survey of the North Pacific ocean, to which reference was made in the *Geographical Journal* for April, 1905, p. 462. The brig *Galilee*, of San Francisco, a wooden sailing vessel of about 600 tons displacement, has been chartered by the Carnegie Institution of Washington for the work. The scientific staff at present consists of Mr. J. F. Pratt (commander), Dr. J. Hobart Egbert (surgeon and magnetic observer), Mr. J. P. Ault (magnetic observer), and Mr. P. C. Whitney (magnetic observer and watch officer), the sailing master being Captain J. T. Hayes. Early in August magnetic observations were made at various places on the shores of San Francisco bay, and the most suitable place for "swinging ship" by their aid determined; afterwards a short experimental cruise was undertaken as far as San Diego, during which daily magnetic observations were obtained, and various instruments and methods tested. On September 1 the *Galilee* sailed for the Hawaiian and Midway islands, and was expected back at San Francisco about December 1. Early in 1906 the expedition will start on a more extended cruise, embracing the entire circuit of the North Pacific ocean.

POLAR REGIONS.

Amundsen's Arctic Expedition.—The news of this expedition that was printed in the December number * has been quickly followed by a further budget, telling of the fortunes of the party down to the end of last October. At that date the *Gjöa* had for the third time gone into winter quarters, but not until the north-west passage had once more, after a long interval, been virtually accomplished. The expedition had already reached a point on the north coast of America near the mouth of the Mackenzie, when, like the fleet of American whalers at work at the time in that part of the Arctic seas, it was forced, by the unusually early advance of severe weather, to prepare for another winter in the far north. From Herschel island, a little to the west of the Mackenzie, Captain Amundsen made his way by dog-sledge to Eagle, in northern Alaska, whence he telegraphed to Dr. Nansen an outline of his doings since leaving his former quarters on King William Land. Gjöa harbour was left on August 13, it being itself then free from ice, though the narrows between Todd island and Point Richardson remained blocked, apart from a narrow channel just as broad as the ship herself. Beyond this there was open water. On the 14th a halt was made at Kaminglu, an encampment of Eskimo a little east of the narrowest part of Simpson strait, where a last meeting with these people took place, one of their number, a youth seventeen years old, accompanying the voyagers for the purpose of seeing something of European civilization. Proceeding on her voyage, after taking supplies of deer-meat on board, the *Gjöa* passed the same day through the narrows of the strait south of Eta island, the channel to the north having been found impracticable by Lieut. Hansen during a

* P. 675. The account there given of the route followed, which was based on Amundsen's letters as printed in the *Times*, needs correction in one or two particulars. It is evident that, as the previous track had led down Peel sound, the *Gjöa* can hardly have passed "through Bellot strait," but probably skirted its western entrance only. Again, as Gjöa harbour lies on the south-east coast of King William Land, only the eastern portion of Simpson strait can have been traversed during the voyage thither. The sledge expedition of the spring of 1905 must also have been destined for the east, not the west, coast of Victoria Land.

boat journey in the summer of 1904. The bottom, which is very level along the shore of King William Land, becomes rougher near the mainland. Near the narrows a depth of 3 fathoms only was obtained. On the 15th the ship passed through a group of more than a hundred islands and islets crowded in the sea between King William and Victoria Land, which had been surveyed by Lieut. Hansen and Sergeant Ristvedt in the previous spring. The intervening channels are shallow and full of shoals, but the pack-ice to the south made it necessary to pass through some of them. In Victoria strait a large body of ice had to be crossed, but clear water was again reached, and the *Gjöa* passed south of Lind island and entered the strait between Victoria Land and the continent. Soon the explorers were in the tracks of Collinson, who was here in 1852–3. Among the points touched at were Cape Colborn (outside Cambridge bay), Douglas and Lambert islands (between which and the mainland a passage with not less than 7 fathoms was found, close to the latter, after some trouble). The Dolphin and Union strait was clear of ice, and, like Collinson in 1853, the *Gjöa* passed near Clerk island without seeing it. The weather now grew rough, with westerly winds. On the 26th the first ship on this side was sighted—the schooner *Charles Hansen* of San Francisco—and other whalers were soon afterwards met with. After passing Cape Bathurst, the voyagers were forced by ice to turn south towards the shallows near the mouth of the Mackenzie, and, after passing Cape Sabine, were finally brought to a halt at King point (placed by Amundsen in 69° 10′ N., 137° 45′ W.), where it was decided to winter. The gallant explorer is to be congratulated on having accomplished, with the slender means at his disposal, a feat which baffled so many well-equipped expeditions in the last century. And it is interesting to find, as has been pointed out to us by a correspondent, that Amundsen's successful voyage has fully confirmed the views of Parry and McClintock as to the most feasible route. Apart from the work of the main expedition, some valuable results were obtained by Lieut. Hansen, who is said to have surveyed the east coast of Victoria Land up to 72° 10′ N. during his sledge expedition in the spring of 1905. Glenelg bay, the furthest reached by Wyniatt of the *Investigator* in 1851 from the opposite direction, is placed in 72° 47′ N., 110° 35′ W., so that only some 40 miles of this coast would now remain unmapped.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

The Motion of Glaciers.—We alluded some time ago (*Journal*, vol. 20, p. 534) to the glacier observations inaugurated by Bavarian scientists in the Hintereisferner, in the Ötzthaler Alps of the Tirol, and to the results obtained down to that time. The observations have been continued with much perseverance by Profs. Blümcke and Finsterwalder, who have now obtained data which permit of generalization to a greater extent than was before possible on the facts of glacier motion as brought out by their observations. Such a summary is given by them in the *Sitzungsberichte* of the Munich Academy of Sciences ('Mathemat.-physikal. Klasse,' 1905, Heft 1). The paper begins with some general remarks on the variations in time of the motion of glaciers, which, the writers point out, are of three different types, viz. (1) Variations which extend over a lengthened period, and result in a change in the size of the glacier snout; (2) variations comprised within a few years only, and having no influence on the size of the glacier; (3) seasonal variations. As regards the first, measurements at the Vernagtferner and Gliederferner have shown that an advance of the glacier is preceded by a great increase in its rate of motion, which may already show a decline before the advance has reached its maximum. Variations of the second class sometimes show great irregularity throughout a period in which the glacier may show a constant movement in one

direction. It was, however, the third class of variations with which the writers' observations were principally concerned, and on which they tend to unexpected conclusions. They describe fully their methods of work, which consisted in the boring of holes in the ice, in which wooden posts were inserted for the sake of easy recognition, and at the same time to serve as a measure of "ablation." At first the chief attention was devoted to the region of the glacier snout, but afterwards operations were extended quite up to the region of the *névé*, positions being chosen adjoining former marks set up for purposes of observation. The results of the observations are fully set forth in tables. As regards variations of longer period, it was found that the rate of propagation downwards of a change in velocity may be from 20 to 150 times the actual rate of motion of the ice. In this it differs from the wave due to an increase in volume, being apparently rather of the nature of a pressure wave. As regards the seasonal variations, it was found that the generally accepted idea that the rate is greater in summer than winter is by no means universally correct. In the Hintereisferner, at least, this is the case only in the lowest third of the glacier, while towards the *névé*-fields the winter motion is distinctly the greater. In fact, the ratio between the two was found to change with remarkable regularity from below upwards. The reason, no doubt, is that the most important factor in the upper region is the winter increase in weight; in the lower, the summer diminution of friction.

GENERAL.

Livingstone College.—We have received the annual report of this institution for 1904–5, from which it appears that the college is successfully continuing its good work of affording a training in the laws of hygiene to those about to undertake work in tropical climates. Since its foundation more than twelve months ago 238 students have been at the college for periods of not less than one term, and many owe it to the knowledge so gained that they have been able to preserve their health amid most unwholesome surroundings. The college is not yet quite self-supporting, but were the advantages offered made use of by a somewhat larger number of students this might easily be the case.

Tropical Hygiene.—We learn with regret that the periodical *Climate*, edited by Dr. Harford, which has done so useful a service in disseminating information as to matters connected with tropical hygiene, will cease to appear in future, the number for October last completing at the same time the sixth volume and the whole series. Readers of *Climate* will not, however, be left unprovided for, as an arrangement has been made whereby four issues yearly of the *Journal of Tropical Medicine* (published by Messrs Bale & Danielsson, of 83–91, Great Titchfield-street) will be devoted to the subjects dealt with by the former journal. These numbers may be subscribed for separately, the subscription being 3*s.* per annum. Back volumes of *Climate* are offered by Dr. Harford at reduced prices.

Report of the Eighth International Geographical Congress.—The report of the Congress held last year in the United States has now been issued, and forms a clearly printed large 8vo volume of over a thousand pages. By the courtesy of the United States Congress, the Report was printed at the Government printing office in Washington, and is bound in the style usual in the case of United States official publications. Besides a short sketch of the organization of the Congress, a diary and minutes of its proceedings, and various reports, propositions, and resolutions, the volume contains 148 papers, either in full or in abstract, of the total of 220 presented to the Congress (some by title only). These are illustrated by a considerable number of maps, diagrams, and photographs.

CORRESPONDENCE.

Hungarian Place-names.

PERMIT me to direct attention to the numerous discrepancies between place-names on English maps of Hungary and those which are in official and general use in that country. It is an obvious deduction, as well as a matter of experience, that, in consequence of this, British travellers who consult our maps before going to Hungary are much perplexed and inconvenienced when they arrive there. At the railway stations, and in the railway time-tables, only Hungarian names are used; merchants and private persons, writing to England for goods, use the Hungarian names in their letters. To facilitate intercourse between Britain and America on the one hand, and Hungary on the other, an illustrated paper entitled *Hungary* is published in English at Budapest; in this only Hungarian place-names are used. In our newspaper reports from Hungary, only Hungarian, and not German, Chinese, or other names, are used. Every year now the number of British visitors to Hungary is rapidly increasing. All these considerations make it evident that our maps urgently need correction.

I am pleased to find by correspondence that several of our leading map publishers acknowledge the need of this alteration, and that one or two have promised to make it as early as possible.

An expression of opinion by the Royal Geographical Society, of course, would have much more weight than that of any private person, and might lead to a general alteration in the near future.

Especially do I urge that our school maps should receive early attention, so that the rising generation shall learn only those names which are of any real service either for business or pleasure.

I should like to point out that many of our maps do not indicate the perfect political equality of Hungary and Austria, and that, in consequence, there is much ignorance on this point, even among educated people.

W. H. SHRUBSOLE.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1905–1906.

Second Meeting, November 20, 1905.—The Right Hon. Sir GEORGE T. GOLDIE, K.C.M.G., D.C.L., LL.D., F.R.S., President, in the Chair.

ELECTIONS.—*Rufus à Barrow; Ashton Charles Allen; Joseph William Brown Arkah; Joseph Albert Arnold; Dr. W. G. G. Arnold, M.A., M.B.; Lieut. Michael Barne, R.N.; Lionel Charles Bastow; Ernest Edward Bird; Major Everard McLeod Blair, R.E.; Maurice B. Blake; Lieut.-Colonel L. John Blenkensop, D.S.O.; Charles Belfield Bone; John Bottomley; Joseph Boxhall, commander s.s. "Morocco;" Rev. J. Cumming Brown; Captain William Henry Bunbury, R.E.; James Frederick Burton; E. A. Chartres; Jefferson Davis Cohn; V. K. Cornish; C. T. Costello, M.B.; Captain Herbert McCally Cowie, R.E.; Major Gilbert Stewart Crawford, R.A.M.C.; Jogindra Nath Das; Hermann Dawson-Gröne; Captain Francis Arthur Dickinson (Duke of Cornwall's Light Infantry); Philip Fraser Dietz; Ernest McLeod Dowson; William Emery; William Exshaw; Thomas George Farmer; Max Farrand; Rev. T. W. Fawthrop; Charles Beresford Fox, M.A.; Charles Friedlander; Kingdon Iregosse Frost; Ronald W.*

Gibbin; Charles Jasper Glidden; Howard Golden; Herbert Symonds Goldsmith; Walter Armstrong Graham; Bernard Hahn; Musgrave Robert Hall; Rev. William Aidan Newman Hall; Frederick William Hayes; Sir Augustus Hemming, G.C.M.G., Lieut. E. F. S. Henderson (Leicester Regiment); John Hennell; R. M. Heron; Richard Stanley Howlden; Charles Francis Hutchison; Dr. Theo Bulkeley Hyslop; Major-General E. R. James; Pestonjee Dinshawj Kahn; Captain Robert Keyworth, R.H.A.; Captain Charles Trevor Lawrence (Hampshire Regiment); A. P. Low; Alexander Mackay; Robert Mackintosh; Ronald Macpherson; Edmund Marsden; Felix Mills; William V. Morris; Captain W. F. O'Connor, C.I.E., I.A., Captain R. Ommanney, R.E. (Topographical Section, General Staff); W. St. John Oswell; Major W. J. Ottley (34th Sikh Pioneers); Lieut. Thomas H. Plummer, I.A.; Henry G. Ponting; J. R. Radford; Captain Hugh Bradley Roberts, R.A.; Robert R. Rusk; Hugh Negus Sandys; Captain Yasunosuke Satow; Hans Christian Schiern; Philip Sheppard; Hubert Smiley; Howard Smith; Sir Herbert de Stern, Bart.; Antony R. Stevens; Murray Stewart; Charles Blades Coverdale Storey; G. Cecil Strathairn; William Marriott Sutton; Robert Stanser Templeton; James Jonathan Thomas; Lieut.-Colonel A. E. G. Watherston, R.E., C.M.G.; Lieut. Arthur John Byng Wavell (Royal Welsh Regiment); Ernest Weakley; Captain Clive Wigram (18th Bengal Lancers); Captain William Hales Wilkie Young (Northumberland Fusiliers).

Introductory remarks by the President.

The Paper read was:—

"First Exploration of the Hoh-Lumba and Sosbon Glaciers (Himalaya)." By Mrs. Fanny Bullock Workman, F.R.S.G.S.

Third Meeting, December 4, 1905.—The Right Hon. Sir GEORGE T. GOLDIE, K.C.M.G., D.C.L., LL.D., F.R.S., President, in the Chair.

ELECTIONS.—*Arthur Barris; Alfredo Jesus da Silva Basto; Frederick Curtis, F.R.C.S.; Arthur John Eveland; Robert Stevens Fraser; Captain H. R. Headlam (York and Lancaster Regt.); Edward W. Heusinger; Frank Henry Houlder; George E. Jacobs-Smith; George William Lamplugh, F.R.S.; Sydney Lorie; Anthony C. Magiaw, M.D.; Stanley Dods Mitcheson; Major J. Weston Parsons Peters (7th Dragoon Guards); James Steel; Lieut. A. W. Stokes, R.E.; William Edwin Wade; Lieut. Henry Charles Woods (Grenadier Guards); B. Minors Woollan.*

The paper read was:—

"Exploration in the Abai Basin, Abyssinia." By H. Weld Blundell, Esq.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C. R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
k. u. k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological, etc.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Alps. *G. Teacher* **3** (1905): 62–70. **Garwood.**

Alpine Lakes, Hanging Valleys, and Corries. By Prof. E. J. Garwood.

Alps—Glaciology. *G. Teacher* **3** (1905): 49–61. **Penck.**

Glacial Features of the Surface of the Alps. By Dr. Albrecht Penck.

Alps—Simplon. *Jahresb. G.-Ethnog. Ges. Zürich* (1904–5): 71–104. **Rosenmund.**

Ueber die Anlage des Simplontunnels und dessen Absteckung. Von Prof. Dr. M. Rosenmund. *With Map and Illustrations.*

Alps—Structure. *B.S. Belge Géol.* **19** (1905): *Procès Verbaux* 127–135. **Van de Wiele.**

Les théories nouvelles de la formation des Alpes et l'influence tectonique des affaissements mediterranéans. Par C. Van de Wiele. *Illustration.*

Austria. *Petermanns M.* **51** (1905): 125–129. **Crammer.**

Einiges über Rückzugserscheinungen des Gletschers der "Uebergossenen Alm" in Salzburg. Von Prof. H. Crammer. *Profile.*

Balkan Peninsula. **Lyde and Mockler-Ferryman.**

A Military Geography of the Balkan Peninsula. By L. W. Lyde and Lieut.-Col. A. F. Mockler-Ferryman. London: A. & C. Black, 1905. Size 7½ × 5, pp. x. and 204. *Maps. Price 5s. net. Presented by the Publishers.*

An attempt to outline, for a particular region, the sort of geographical knowledge required for the successful prosecution of military operations. The book contains much that is of interest to the general reader, and is a welcome contribution to a subject that has been too much neglected.

Balkan Peninsula. *Iz. Imp. Russ. G.S.* **40** (1904): 399–436. **Moshkoff.**

Turkish tribes in the Balkan Peninsula. By B. A. Moshkoff. [In Russian.]

Baltic Sea. **Stenius.**

Conseil Perm. Internat. Explor. Mer; Publ. Circonstance **15** (1904): pp. 7.

Ein Versuch zur Untersuchung der Hydrographischen Veränderungen in der Nördlichen Ostsee sowie im Finnischen und im Bothnischen Meerbusen. Von Sigurd Stenius. *Diagrams.*

On variations in salinity, etc.

Belgium. ———

La Belgique. [1830–1905.] Institutions, Industrie, Commerce. Bruxelles: J. Goemaere, 1905. Size 10½ × 7, pp. xx. and 870. *Map and Illustrations. Presented by M. le Ministre de l'Industrie et du Travail.*

Gives a comprehensive view of modern Belgium, especially from the point of view of industry and commerce.

Belgium. *B.S. Belge Geol.* **19** (1905): *Procès Verbaux* 20–41. **Simoens.**

Deuxième note sur la tectonique de la vallée de la Senne. Par G. Simoens. *Illustrations.*

Belgium—Antwerp. **Hertslet.**
Scheme for the Extension of the Port of Antwerp. F. O., Miscellaneous, No. 640, 1905. Size 9½ × 6½, pp. 12. *Plan. Price 7d.*

Bulgaria—Meteorology. *Petermanns M.* **51** (1905): 176–180. **Kassner.**
Die Temperaturverteilung in Bulgarien. Von Dr. K. Kassner. *Maps and Diagram.*

Carpathians. *Abrégé B.S. Hongroise G.* **32** (1904): 46–60. **Czirbusz.**
Das Czárku-Gebirge. Von D. Géza Czirbusz. (*Földr. Közl.* **32**, 1904: 143–159. *Illustrations.*)

Carpathians. *Abrégé B.S. Hongroise G.* **32** (1904): 63–71. **Lóczy.**
Ueber die Seen des Retyezát-Gebirges. Von Dr. L. v. Lóczy. (*Földr. Közl.* **32** (1904): 224–233. *Maps.*)

Carpathians. *Abrégé B.S. Hongroise G.* **32** (1904): 128–132. **Sztankovits.**
Die mittlere Höhe der über das Gebirgssystem der Karpaten verlaufenden höchsten Linie. Von E. Sztankovits. (*Földr. Közl.* **32** (1904): 349–355. *Map.*)

Europe. *Naturw. Wochenschrift* **4** (1905): 593–597. **Penck.**
Das Klima Europas während der Eiszeit. Von Prof. Dr. A. Penck.

Europe—Capitals. **Buschick.**
Wanderungen europäischer Hauptstädte. Von R. Buschick. (Friedrich Ratzels Gedächtnis, 1904. Pp. 3–22.)

Færoes. *Rev. G.* **55** (1905): 311–316. **Vinci.**
Les îles Faroe. Par V. Gaudard de Vinci. *With Illustrations.*

France. *Ann. G.* **14** (1905): 236–244. **Margerie.**
La nouvelle carte de France au 50,000e du Service géographique de l'Armée. Par E. de Margerie. *With Map.*

France. *B.S.G. Com. Bordeaux* **31** (1905): 269–278. **Lestrade.**
Garonne, Gironde. Par P. Lestrade.
Contests the views of M. St. Joure (*ibid.*, p. 161) as to the history of the names.

France. *La G., B.S.G. Paris* **12** (1905): 145–148. **Bénard.**
L'érosion marine à la Pointe de la Coubre. Par C. Bénard. *With Diagrams.*

France. *La G., B.S.G. Paris* **11** (1905): 257–284, 343–358, 413–434. **Fabre.**
Le sol de la Gascogne. Par L. A. Fabre. *With Maps and Sections.*

France. *La G., B.S.G. Paris* **11** (1905): 435–446. ———
Explorations glaciaires accomplies en France pendant l'été 1904. *With Map.*

France. *La G., B.S.G. Paris* **12** (1905): 178–180. **Rabot.**
Histoire d'un torrent des Alpes françaises. Par C. Rabot.

France—Census. ———
Résultats statistiques du Recensement général de la population effectué le 24 mars 1901. Tome i. Introduction, Population légale ou de résidence habituelle pour la France entière; Population présente: Régions de Paris, du Nord et de l'Est. Paris, 1904. Size 11 × 9, pp. xxiv. and 870.

France—Isle de France. **Gallois.**
Atti Congresso Internat. Sc. Storiche, 1903, **10** (1904): 19–24.
Une région naturelle française; le pays de France. Del Prof. L. Gallois. *With Map.*
"La France," in its narrowest sense, was formerly the designation of a district circumscribed by the Seine, the Marne, and the Oise, and tributaries of the two last. The use still lingers in the designations Mareil and Châtenay "en France."

France—Speleogy. *Spelunca* **6** (No. 41) (1905): pp. 192. **Martel.**
La Spéléologie au XXe Siècle (Revue et Bibliographie des recherches souterraines de 1901 a 1905). Par E. A. Martel. 1ère Ptie: France. *With Sections.*

France—Tarn. *Rev. G.* **55** (1905): 293–301. **Nauzières.**
Le Sidobre. Par R. Nauzières. *With Map and Illustrations.*

France and Switzerland. *Questions Diplomatiques* **9** (1905): 142–146. **Pinon.**
Le Simplon et la Faucille. Par René Pinon.

Germany. *M.V. Halle-a.-S.* (1905): 17–44. **Grössler.**
Die Einteilung des Landes zwischen unterer Saale und Mulde in Gaue und Archidiakonate. Von Prof. Dr. H. Grössler. *With Map.*

Germany—Fuhne. *M.V.E. Halle-a.-S.* (1905): 1–16. **Müller.**
Die hydrographische Entwicklung der Fuhneniederung. Von Dr. A. Müller. *With Map.*
The Fuhne is a tributary of the Saale.

Germany—Hydrology. *Petermanns M.* **51** (1905): 187–189. **Fischer.**
Die Wasserstandsbewegung in den norddeutschen Flussgebieten im hydrologischen Jahre 1901. Von Dr. F. J. Fischer.

Germany—Magdeburg. *M.V.E. Halle-a.-S.* (1905): 44–79. **Jacob.**
Die geographisch bedingten wirtschaftlichen Grundlagen der Magdeburger Gegend. Von T. Jacob. *With Maps.*

Germany—Prussia. *Naturw. Wochenschrift* **20** (1905): 561–571, 577–585. **Hilbert.**
Eine naturwissenschaftliche Wanderung über die kurische Nehrung. Von Dr. Richard Hilbert. *With Map and Illustrations.*

Germany—Schleswig. *Globus* **88** (1905): 109–111. **Moritz.**
Die Hallig Jordsand. Von E. Moritz.

Germany—Wends. *Forsch. deutsch. Landes- u. Volksk.* **16** (1) (1905): pp. 124. **Witte.**
Wendische Bevölkerungsreste in Mecklenburg. Von Dr. H. Witte. *With Map.*

Greece. *G.Z.* **11** (1905): 445–475. **Chalikiopoulos.**
Wirtschaftsgeographische Skizze Thessaliens. Von Dr. L. Chalikiopoulos.

Greece—Platæa. **Zikos.**
K. Zikos. Etude Historique sur la Détermination des Positions de la Bataille de Platées. [In Greek and French.] Athens, 1905. Size 7 × 5, pp. 70. *Map.*

Greece—Santorin. *B.S.R. Belge G.* **28** (1904): 413–431; **29** (1905): 47–62. **Hauttecœur.**
L'île de Santorin. Par H. Hauttecœur. *With Map.*

Holland—Hydrology. *B.S. Belge Géol.* **19** (1905): *Procès-Verbaux*, 59–65. **Dubois.**
E. Dubois. Études sur les eaux souterraines des Pays-Bas. L'eau douce du sous-sol des Dunes et des Polders.

Holland—Ice-age. *K.A.W. Amsterdam, P. Sec. Sc.* **7** (1904): 40–41. **Dubois.**
On the direction and the starting-point of the diluvial ice-motion over the Netherlands. By Prof. E. Dubois.

Holland—Tides. **Van der Stok.**
Etudes des Phénomènes de Marée sur les Côtes Néerlandaises (K. Nederlandsch Meteorologisch Instituut, No. 90). II. Résultats d'Observations faites à bord des Bateaux-Phares Néerlandais, par J. P. Van der Stok (pp. 84). III. Tables des Courants, by the same (pp. 106). Utrecht, 1905. Size 10 × 7. *Diagrams. Presented by the K. Nederlandsch Meteorologisch Instituut.*

Hungary. *Abrégé B.S. Hongroise G.* **31** (1903): 54–60. **Balogh.**
Die mittlere Höhe des grossen ungarischen Tieflandes. Von Dr. M. Balogh. (*Földr. Közl.* **31** (1903): 379–390. *Map.*)

Hungary. *Abrégé B.S. Hongroise G.* **33** (1905): 33–42. **Beluleszko.**
Eine siedlungsgeographische Untersuchung der Unteren Donaugegend. Von A. Beluleszko. (*Földr. Közl.* **33** (1905): 83–95. *Maps.*)

Hungary. *Abrégé B.S. Hongroise G.* **32** (1904): 85–95. **Bogdánfy.**
Die Wasserführung der Tisza. Von Edmund von Bogdánfy. (*Földr. Kozl.* **32** (1904): 275–283.)

Hungary. *Abrégé B.S.G. Hongroise* **32** (1904): 175–180. **Cholnoky.**
Die wissenschaftliche Erforschung des Alföld. Von Dr. Eugen von Cholnoky. (*Földr. Közl.* **32** (1904): 456–461.)

Hungary. *Abrégé B.S. Hongroise G.* **32** (1904): 101–108. **Györy.**
Die Mittlere Höhe des kleinen ungarischen Tieflandes. Von Ella v. Györy. (*Földr. Közl.* **32** (1904): 314–319.)

Hungary. *Abrégé B.S. Hongroise G.* **33** (1905): 44–46. **Harmos and Stojanovits.**
Die mittlere Höhe der Diluvialplatte zwischen der Donau und der Tisza. Von E. Harmos und D. Stojanovits. (*Földr. Közl.* **33** (1905): 116–117. *Section.*)

Hungary. *Abrégé B.S. Hongroise G.* **33** (1905): 76–77. **Klein.**
Eigenheiten des Klimas von Ungarn. Von A. Klein. (*Földr. Közl.* **33** (1905): 240–247. *Diagrams.*)

Hungary. *Abrégé B.S. Hongroise G.* **32** (1904): 150–173. **Márki.**
Ueber den Namen Kolozsvár. Von Alexander Márki. (*Földr. Közl.* **32** (1904): 398–419.)

Hungary. *Abrégé B.S. Hongroise G.* **32** (1904): 1–11. **Mihutia.**
Die hydrographischen Verhältnisse des Kalkplateaus von Vaskóh. Von A. Mihutia. (*Földr. Közl.* **32** (1904): 1–31.)

Hungary. *Abrégé B.S. Hongroise G.* **32** (1904): 133–136. **Timkó.**
Das Ecseder Moor. Von E. Timkó. (*Földr. Közl.* **32** (1904): 369–381. *Illustrations.*)

Hungary—Population. *Abrégé B.S. Hongroise G.* **33** (1905): 7–10. **Zombory.**
Die Volksdichtigkeit Ungarns im Gebiete jenseits der Donau auf Grund der Daten der Volkszählung vom Jahre 1900. Von I. Zombory. (*Földr. Közl.* **33** (1905): 18–21.)

Iceland. *Sitzb. K.A.W. Wien* **113**, *Abt.* 2*a* (1904): 183–269. **Hann.**
Die Anomalien der Witterung auf Island in dem Zeitraume 1851 bis 1900 und deren Beziehungen zu den gleichzeitigen Witterungsanomalien in Nordwesteuropa. Von J. Hann.

Iceland. *G. Ts.* **18** (1905–6): 98–112. **Thoroddsen.**
Lavaørkener og Vulkaner paa Islands Højland. Geografiske og geologiske Undersøgelser. Af Prof. Dr. T. Thoroddsen.

Italy. *B.S.G. Italiana* **6** (1905): 609–619. **Revelli.**
La Contea di Modica. Contributo al Glossario dei nomi territoriali italiani. Nota del Prof. P. Revelli.

Italy—Marches. **Porena and Others.**
Club Escursionisti di Iesi. Perché si debba dire Marche e non Marca. Lettere dei Professori F. Porena, O. Marinelli, C. Maranelli. Iesi, 1905. Size 9½ × 6½, pp. 14.

Italy—Place-names. **Grasso.**
Atti Congresso Internat. Sc. Storiche (1903): **10** (1904): 27–38.
Del significato geografico del nome *Fiesso* in Italia, e di un antico nome *ad Flexum* incorporato nel nome di "S. Pietro in fine." Del Prof. Gabriele Grasso. *Map.*

Italy—Sardinia. *Rev. G. Italiana* **12** (1905): 267–273. **Loperfido.**
Nuovo Collegamento Geodetico dell' Isola di Sardegna al Continente. Di Antonio Loperfido. *Map.*

Italy—Sicily. **Wermert.**
Die Insel Sicilien in volkswirtschaftlicher, kultureller und sozialer Beziehung. Von G. Wermert. Berlin: Dietrich Reimer (Ernst Vohsen), 1905. Size 11½ × 8, pp. 6 and 488. *Map. Price* 10*s.* [To be reviewed.]

Italy—Stromboli. *C.R.* **141** (1905): 575–579. **Lacroix.**
Sur le tremblement de terre ressenti le 8 septembre à Stromboli et sur l'état actuel de ce volcan. Dr. A. Lacroix.

Jura. *B.S.G. Lille* **44** (1905): 141–148. **Blanchard.**
Le Jura. Par R. Blanchard. *With Illustrations.*

Limnology—Seiches. *Riv. G. Italiana* **12** (1905): 127–135, 216–225, 291–299. **Magrini.**
I recenti studi sulle sesse e le sesse nei laghi italiani. Del Dott. G. P. Magrini. *Diagrams. Also separate copy, presented by the Author.*

Northern Europe. **Harvie-Brown.**
Travels of a Naturalist in Northern Europe. Norway, 1871; Archangel, 1872; Petchora, 1875. By J. A. Harvie-Brown. 2 vols. London: T. Fisher Unwin, 1905. Size 9½ × 6½, pp. xiv. and 542. *Maps and Illustrations. Price* 63*s. net. Presented by the Publisher.* [To be reviewed.]

North Sea. *Conseil Explor. Mer. Publ. Circ.* No. 19 (1904): pp. 8. **Helland-Hansen.**

Zur Ozeanographie des Nordmeeres. Resumé eines am 22. Juli gehaltenen Vortrags von B. Helland-Hansen. *Diagrams.*

Norway—Flora. **Norman.**

Norges Arktiske Flora. II. Oversigtlig Fremstilling af Karplanternes Udbredning, forhold til omgivelserne M. M. 2den. Halv. J. M. Norman. Kristiania: H. Aschehoug & Co., 1901. Size 10 × 6½, pp. 443–623.

Norway and Sweden. *G.Z.* **11** (1905): 425–435. **Reusch.**

Norwegens Verhältnis zu Schweden vom geographischen Geschichtspunkte aus. Von Dr. H. Reusch. *With Maps.*

Norway and Sweden. *National G. Mag.* **16** (1905): 429–431. ———

A Comparison of Norway and Sweden.

Norway—Meteorology. **Mohn.**

Jahrbuch des Norwegischen Meteorologischen Instituts für 1900 (pp. xii. and 122). Ditto, 1901 (pp. xii. and 122). Ditto, 1902 (pp. xii. and 122). Ditto, 1903 (pp. xii. and 120). Christiania, 1901–04. Size 13 × 10.

United Kingdom—England. **Cox.**

The Royal Forests of England. By J. C. Cox, LL.D. [The Antiquary's Books.] London: Methuen & Co., 1905. Size 9 × 6, pp. xvi. and 372. *Illustrations. Price 7s. 6d. net. Presented by the Publishers.*

An interesting book, supplying for the first time a comprehensive and systematic sketch of the history of the Royal forests, from material in the Record Office and elsewhere. The standpoint is, however, rarely that of the geographer, the book dealing rather with forest customs and administration than with changes in the extent of the forests, their relation to soil and climate, and such matters. Still, the data supplied would no doubt prove useful to any one desirous of tracing the changes to which the surface of the country has been subject within historic times.

United Kingdom—Somersetshire. **Richmond.**

The Story of Somersetshire. By W. R. Richmond. London: Wake & Dean, [*not dated*]. Size 7½ × 5, pp. xii. and 296. *Map and Illustrations. Price 4s. 6d. Presented by the Publishers.*

Traces, in an interesting way, the part played by Somersetshire in the leading events of English history.

ASIA.

Ceylon. **Warren.**

Ceylon. Administration Reports, 1904. Part i. Civil Survey. Report of Mr. P. D. Warren, Surveyor-General. Size 13½ × 8½, pp. 36. *Maps, Plans, and Illustrations. Presented by the Surveyor-General, Ceylon.*

Central Asia. **Hedin and Ekholm.**

Sven Hedin. Scientific Results of a Journey in Central Asia, 1899–1902. Vol 2. Lop-Nor, by Dr. S. Hedin. Vol. 5, Part ia. Meteorologie, von Dr. N. Ekholm. I. Die Beobachtungen, 1894–1897 und 1899–1902. Stockholm: P. A. Norstedt & Söner, 1905. Size 13 × 10, pp. 716, xii., and 402. *Maps and Illustrations. Maps*, vol. 2, *in separate case*, size 16 × 11½. *Presented by Dr. S. Hedin.*

Central Asia—Tian Shan. *B. American G.S.* **37** (1905): 513–530. **Huntington.**

The Mountains and Kibitkas of Tian Shan. By E. Huntington. *With Sections.*

Central Asia—Tian Shan. **Merzbacher.**

The Central Tian-Shan Mountains, 1902–1903. By Dr. G. Merzbacher. Published under the authority of the Royal Geographical Society. London: John Murray, 1905. Size 9 × 6, pp. viii. and 294. *Map and Illustrations. Price 12s. net. Presented by the Publisher.*

China. *Abrégé B.S. Hongroise G.* **33** (1905): 67–75. **Cholnoky.**

Die grosse chinesische Tiefebene. Von E. v. Cholnoky. (*Földr. Közl.* **33** (1905): 224–239. *Map and Illustrations.*)

China. **Cholnoky.**

River-Regulation and Soil-Amelioration in China. By Dr. Eugenius Cholnoky. [In Hungarian.] (Vizügyi Közlemények, xxi. Füzet.) Budapest, 1905. Size 10 × 7, pp. 100. *Maps and Illustrations. Presented by the Author.*

China. **Hardy.**

John Chinaman at Home. Sketches of Men, Manners, and Things in China. By the Rev. E. J. Hardy. London: T. Fisher Unwin, 1905. Size 9 × 6, pp. 336. *Illustrations. Price* 10*s.* 6*d. net. Presented by the Publisher.*

The author travelled a good deal in Central and Southern China when on leave of absence from his post as chaplain to the forces at Hong-Kong. He has evidently taken much pains to understand the Chinese character, and his sketches of native life away from the reach of foreign influence are of some original value.

China. ——

China. Imperial Maritime Customs. I.—Statistical Series: Nos. 3 and 4. Returns of Trade (46th Issue) and Trade Reports (40th Issue), 1904. Part i.—Report on the Working of the Post Office (a continuation of Part i.—Abstract of Statistics of the Trade of China). Shanghai: Kelly & Walsh, 1905. Size 11 × 8½, pp. 20. *Map.*

China—Historical. *English Historical Rev.* **20** (1905): 625–636. **Parker.**

China and the Ancient Cabul Valley. By E. H. Parker.

China—Kiao-Chou. *Deutsche G. Blätter* **28** (1905): 87–112. **Kolshorn.**

Die wirtschaftliche Bedeutung und Entwickelung des Kiautschougebietes. Von Walther Kolshorn.

China—Sechuan. *La G., B.S.G. Paris* **12** (1905): 87–98. **Legendre.**

Le Sseu-tch'ouan, son sol, son climat, ses productions. Par Dr. A. F. Legendre.

China—Trade. ——

China. Imperial Maritime Customs. I. Statistical Series. Nos. 3 and 4. Returns of Trade and Trade Reports, 1904. Part ii. Reports and Statistics for each Port. Vol. i. Northern Ports. Shanghai, 1905. Size 11½ × 8½, pp. xvi. and 534. *Maps and Diagrams.*

Chinese Empire—Tibet. *J. and P. Asiatic S. Bengal* **1** (1905): 106–116. **Chandra Das.**

The Monasteries of Tibet. By Rai Sarat Chandra Das.

Chinese Empire—Tibet. **Chandra Das.**

J. Asiatic S. Bengal **73**, Pt. i., Extra No. (1904): 80–93.

The Hierarchy of the Dalai Lama (1406–1745). By Rai Sarat Chandra Das.

Chinese Empire—Tibet. **Chandra Das.**

J. Asiatic S. Bengal **73**, Pt. i., Extra No. (1904): 94–102.

Tibet under the Tartar Emperors of China in the 13th century A.D. By Rai Sarat Chandra Das.

Chinese Empire—Tibet. *Globus* **88** (1905): 149–154. **Götz.**

Wilh. Filchners Reise in Ost-Tibet. Von W. Götz. *With Illustrations.*

See note in the *Journal* for May 1905 (p. 562).

Chinese Empire—Tibet. **Rawling.**

The Great Plateau, being an account of exploration in Central Tibet, 1903, and of the Gartok Expedition, 1904–1905. By Captain C. G. Rawling. London: E. Arnold, 1905. Size 9 × 6, pp. xii. and 324. *Maps and Illustrations. Price* 15*s. net. Presented by the Publisher.*

This important work will be reviewed in an early number.

Chinese Turkestan. *B. Comité Asie Française* **5** (1905): 370–372. ——

Une mission archéologique au Turkestan Chinois.

On an expedition undertaken by M. P. Pelliot.

Dutch East Indies. **Blink.**

Nederlandsch Oost- en West-Indië. Geographisch, ethnographisch en economisch beschreven. Door Dr. H. Blink. Eerste Deel. Leiden: E. J. Brill, 1905. Size 10 × 7, pp. xii. and 576. *Maps and Illustrations.*

To be completed in two volumes.

Dutch East Indies—Volcanoes. **Baren.**

De Vulkanen van Ned.-Indië (Overgedrukt uit de Encyclopædie van N.-I.) Van J. van Baren. (N.P. 1905.) Size 10½ × 7, pp. [7]. *Presented by the Author.*

Eastern Asia. *Ann. G.* **14** (1905): 245–258. **Gallois.**

La structure de l'Asie orientale d'après les travaux récents. Par L. Gallois.

Eastern Asia. **Jagatjit Singh.**

My Travels in China, Japan, and Java, 1903. By H. H. the Raja-i-Rajgan Jagatjit Singh of Kapurthala. London: Hutchinson & Co., 1905. Size 9 × 6½, pp. xii. and 226. *Map and Illustrations. Price* 12*s.* 6*d. net. Presented by the Publishers.* [To be reviewed.]

Eastern Asia. **Little.**

The Far East. By Archibald Little. (The "Regions of the World" Series, edited by H. J. Mackinder.) Oxford: The Clarendon Press, 1905. Size 9½ × 6, pp. viii. and 334. *Maps and Illustrations. Price* 7*s.* 6*d. net. Presented by the Delegates of the Press.*

See review, *ante*.

Eastern Asia. **Whitney.**

Jungle Trails and Jungle People. Travel, Adventure, and Observation in the Far East. By C. Whitney. London: T. W. Laurie, 1905. Size 9 × 6, pp. xvi. and 310. *Illustrations. Price* 12*s. net. Presented by the Publisher.*

Striking descriptions of the jungles of the Far East (India, Sumatra, Siam, etc.), with the men and beasts that inhabit them.

Eastern Asia—Russo-Japanese Treaty. *A travers le Monde* **11** (1905): 293–294. ——

Résultats géographiques du Traité de Portsmouth. *With Maps.*

Eastern Asia—Sakhalin. *B.S. Études Col.* **12** (1905): 541–554. **Geerts.**

L'Ile de Sakhaline. Par R. Geerts. *With Map and Illustrations.*

French Indo-China—Cambodia. **Gerini.**

Imp. and Asiatic Quarterly Rev. **17** (1904): 355–398; **19** (1905): 361–394; **20** (1905): 89–101.

A Trip to the Ancient Ruins of Kamboja. By Lieut.-Col. G. E. Gerini.

French Indo-China—Laos. *Ann. G.* **14** (1905): 274–276. **Parcevaux.**

Les voies d'accès au Laos supérieur. Par H. de Parcevaux.

French Indo-China—Railway. *B.S.G. Lille* **44** (1905): 188–191. ——

Le Trans-Indo-Chinois. *With Map.*

India. *Imp. and Asiatic Quarterly Rev.* **20** (1905): 39–46. **Fischer.**

The Mopand Irrigation Project, Madras. By General J. F. Fischer.

India—Assam. **Barnes.**

Report on the Trade between Assam and the adjoining Foreign Tribes and Countries for the Three Years ending March 31, 1905. By H. C. Barnes. Shillong, 1905. Size 10 × 8½, pp. 20.

India—Baluchistan. *Imp. and Asiatic Quarterly Rev.* **20** (1905): 10–18. **Black.**

Baluchistan and its Possibilities. By C. E. D. Black.

A useful summary of existing knowledge, with a discussion of the strategic advantages offered by the country. Mr. Black urges the advisability of an economic and statistical survey.

India—Bengal. **Hill.**

Indian Records Series. Bengal in 1756–1757. A selection of Public and Private Papers dealing with the affairs of the British in Bengal during the reign of Sirajuddaula. Edited with Notes and an Historical Introduction by S. C. Hill. 3 vols. Published for the Government of India. London: J. Murray, 1905. Size 9½ × 6½, pp. (vol. i.) cxii. and 308; (vol. ii.) xx. and 470; (vol. iii.) viii. and 488. *Maps, Plans, and Illustrations. Price* (3 *vols.*), 36*s. net. Presented by the Publisher.*

India—Calcutta. **Blechynden.**

Calcutta, Past and Present. By Kathleen Blechynden. London: W. Thacker and Co., 1905. Size 8½ × 5½, pp. xvi. and 246. *Illustrations. Presented by the Publishers.*

This work does not profess to compete with existing histories of English enterprise in Bengal, but aims rather at pourtraying the personal life of the actors in that field. The author possesses the advantage of a family connection with Calcutta extending over a number of years, which has put in her hands many personal records, besides maps on which changes were recorded as they occurred.

India—Earthquake. *Rev. G. Italiana* **12** (1905): 312–317. **Alfani.**

Il grande terremoto d'India del 4 aprile 1905, e le registrazioni sismiche all' Osservatorio Ximeniano di Firenze. Del P. Guido Alfani.

India—Historical. **Lyall.**

The Rise and Expansion of the British Dominion in India. By Sir A. Lyall, K.C.B., etc. 3rd edit. London: John Murray, 1905. Size 9 × 6, pp. xviii. and 356. *Maps. Price 5s. net. Presented by the Publisher.*

This forms practically a new work, the whole having been re-cast and much extended, its value being thus greatly enhanced.

India—N.-W. Frontier. *J. Asiatic S. Bengal* **73**, Pt. 3, Extra No. (1904): 1–34. **Rose.**

Customs in the Trans-border territories of the North-West Frontier Province. Communicated by H. A. Rose.

India—River Húgli. **Vernon-Harcourt.**

Minutes of P.I. Civil Engineers **160** (1905): 100–210.

The River Hooghly. By L. F. Vernon-Harcourt. *With Maps.*

Noticed in the November number (p. 554).

Japan—Volcanic Islands. *J. Tōkyō G.S.* **17** (1905): 274–276. **Kanehara.**

A New Volcanic Island appeared near S. Augustino (Volcano Islands). By Nobuyasu Kanehara. *With Map.* [In Japanese.]

Korea. *Iz. Imp. Russ. G.S.* **40** (1904): 330–354. **Korf.**

The population of Korea. By N. A. Korf. [In Russian.]

Korea. **Rockhill.**

China's Intercourse with Korea from the Fifteenth Century to 1895. By W. W. Rockhill. London: Luzac & Co., 1905. Size 8½ × 5½, pp. 60. *Illustrations. Price 3s. 6d. net. Presented by the Publishers.*

See note in the December number.

Malay Archipelago—Celebes. *Globus* **88** (1905): 154–158, 171–175, 191–195. **Richter.**

Unsere gegenwärtige Kenntnis der Ethnographie von Celebes. Von O. Richter.

Malay Archipelago—Celebes. **Sarasin.**

Reisen in Celebes ausgeführt in den Jahren 1893–1896 und 1902–1903. Von Paul und Fritz Sarasin. 2 vols. Wiesbaden: C. W. Kreidel, 1905. Size 9½ × 6½, pp. (vol. 1) xviii. and 382; (vol. 2) x. and 390. *Maps and Illustrations. Presented by the Authors.* [To be reviewed.]

Malay Archipelago—Sumatra. **Blok.**

K.A.W. Amsterdam, P. Sect. Sc. **7** (1905): 453–459.

The connection between the primary triangulation of South Sumatra and that of the West Coast of Sumatra. By S. Blok. *With Maps.*

Cf. Note in the December number.

Persia. **Morgan.**

Mission scientifique en Perse. Par J. de Morgan. Tome III. 1 Partie. Études géologiques. Géologie Stratigraphique. Paris: E. Leroux, 1905. Size 11½ × 9, pp. iv. and 134. *Map and Illustrations.*

Persia. *A travers le Monde* **11** (1905): 349. ———

Projet d'un nouveau Chemin de fer russe sur la Frontière de Perse (Erivan à Djoulfa). *With Map.*

Tibet and Turkestan. **Crosby.**

Tibet and Turkestan, a Journey through old Lands and a Study of New Conditions. By O. T. Crosby. New York and London: G. P. Putnam's Sons, 1905. Size 8½ × 6, pp. xvi. and 332. *Map and Illustrations. Price 10s. 6d. net. Presented by the Author.* [To be reviewed.]

AFRICA.

Abyssinia. *B.S.G. Marseille* **29** (1905): 25–28. **Le Roux.**

Seconde visite au Négus d'Abyssinie. Conférence de H. Le Roux.

Africa—Disease. **Balfour.**

First Report of the Wellcome Research Laboratories at the Gordon Memorial College, Khartoum. By the Director, Dr. A. Balfour. Khartoum: Dep. of Education, Sudan Government, 1904. Size 11 × 8, pp. 84. *Map and Illustrations. Presented by Dr. A. Balfour.*

Africa—Historical. *M.K.K.G. Ges. Wien* **48** (1905): 283–383. **Hartig.**

Ältere Entdeckungsgeschichte und Kartographie Afrikas mit Bourgignon d'Anville als Schlusspunkt (1749). Von Dr. O. Hartig. *With Maps.*

Africa—Railways. *Deutsch. Kolonialzeitung* **22** (1905): 393–394. **Singelmann.**

Afrikanische Querbahn-Projekte. Von C. Singelmann. *With Map.*

Refers to projected railways across South Africa between 10° and 20° S.

Algeria and Morocco. *B.S.G. Marseille* **29** (1905): 5–17. **Levat.**

Les confins de l'Algérie et du Maroc. Conférence de D. Levat. *With Map.*

Algeria and Tunis. *B.S.G. Marseille* **29** (1905): 46–60. **Gallois.**

Oasis algériennes et tunisiennes. Par E. Gallois.

Algerian Sahara. **Phillipps.**

In the Desert. By L. March Phillipps. London: E. Arnold. Size 9½ × 6, pp. xvi. and 288. *Map and Illustrations. Price* 12*s.* 6*d. net. Presented by the Publisher.*

Contains some vivid sketches of desert scenery, with an attempt to pourtray the influence it has exercised on Arab character, poetry, and art.

British East Africa. **Bailie, etc.**

Report on the Pastoral and Agricultural Capabilities of the East Africa Protectorate. By J. C. Bailie, T. C. Hinds, and F. R. N. Findlay. Johannesburg, [1904]. Size 8½ × 5½, pp. 24. *Presented by Lord Hindlip.*

See note in the December number.

British East Africa. **Hindlip.**

British East Africa, Past, Present, and Future. By Lord Hindlip. London: T. Fisher Unwin, 1905. Size 8 × 5, pp. xiv. and 142. *Price* 3*s.* 6*d. net. Presented by the Publisher.*

Discusses various questions affecting the future of British East Africa from full knowledge gained on the spot.

British East Africa. ———

Africa No. 6 (1905). Reports relating to the Administration of the East Africa Protectorate. London: Wyman & Sons, 1905. Size 13½ × 8½, pp. 54. *Price* 5½*d.*

Central Africa. *B.S.G. Italiana* **6** (1905): 678–708. **Baccari.**

I grandi laghi Africani. Conferenza del dott. E. Baccari. *With Illustrations.*

Account of travels in the region of the Central African rift-valley, with ascents in the volcanic group north of Kivu.

Central Africa. **Hoffmann.**

Petermanns M. **51** (1905): 81–90, 108–115, 129–136, 150–161.

Die tiefsten Temperaturen auf den Hochländern des südäquatorialen tropischen Afrika (insbesondere des Seenhochlandes). Von Dr. J. Hoffmann.

East Africa—Language. **Madan.**

Swahili (Zanzibar) Grammar. By A. C. Madan. Oxford: Clarendon Press, 1905. Size 7 × 5, pp. 62. *Price* 1*s. net. Presented by the Publishers.*

Egypt. **Lucas.**

Ministry of Finance. The Blackened Rocks of the Nile Cataracts and of the Egyptian Deserts. By A. Lucas. Cairo, 1905. Size 11 × 7½, pp. 58.

To be noticed in the Monthly Record.

Egyptian Sudan. **Gleichen.**

The Anglo-Egyptian Sudan: A Compendium prepared by Officers of the Sudan Government. Edited by Lieut.-Colonel Count Gleichen, C.M.G., etc. 2 vols. London: Wyman & Sons, 1905. Size 12½ × 10, pp. (vol. 1) xiv. and 372; (vol. 2) viii. and 236. *Maps and Illustrations. Price* (vol. 1) 10*s.*, (vol. 2) 7*s.* 6*d. Presented.*

By far the most complete and systematic description of the Eastern Sudan that has yet appeared, forming a valuable summary of our geographical knowledge at the present time, with much information on the resources, administration, etc., of the country.

French Sudan. **Fourneau.**

Renseignements Colon., Comité Afrique Française (1905): 105–122.

La ravitaillement par le Bas-Niger (Mission Lucien Fourneau, 1902–04). Capitaine L. Fourneau. *With Map and Illustrations.*

French West Africa. **Paulhiac.**

Promenades Lointaines. Sahara, Niger, Tombouctou, Touareg, par le Lieutenant H. Paulhiac. Préface par Hugues Le Roux. Paris: Plon-Nourrit et Cie., [*not dated*]. Size 8 × 5½, pp. xxii. and 498. *Maps and Illustrations. Price 5s.*

The author, who has played a part of some importance in the extension of French influence on the southern borders of the Sahara, here presents the results of his observations on many points affecting the future of that region, and the relations between Europeans and natives. The work is more than a mere record of travel, and bears witness to thoughtful study of the problems involved.

German East Africa. *Deutsch. Kolonialzeitung* **22** (1905): 370–372. **Arning.**

Das Dondeland und seine Bewohner. Von Dr. W. Arning.

German East Africa. **Claste.**

Miss. Catholiques **37** (1905): 411–414, 425–432, 437–440.

A travers l'Afrique Équatoriale. Mœurs et Coutumes des Bagoyé. Par le R. P. Classe. *Illustrations and Map.*

The Bagoye dwell to the north and east of Lake Kivu.

German East Africa. *Globus* **88** (1905): 167–171. ——

Das Bahnprojekt Kilwa—Nyassa. *With Illustrations.*

Gold Coast. ——

Northern Territories of the Gold Coast. Report for 1904. Colonial Reports, Annual No. 457, 1905. Pp. 30. *Price 2d.*

Gough Island. **Brown, Wright, and Darbishire.**

J. Linnean S. (Botany) **37** (1905): 238–250, 263–267.

The Botany of Gough Island. By R. N. Rudmose Brown, C. H. Wright, and O. V. Darbishire. *With Plates.*

Kamerun. *Deutsches Kolonialblatt* **16** (1905): 526–533. **[Dominik.]**

Die Bapea Expedition. *With Map.*

The Bapea are a little-known tribe to the north of the Sanaga.

Kamerun. *M. Deutsch. Schutzgeb.* **18** (1905): 179–193. **Moisel and Schipper.**

Begleitworte zu der Karte 3 "Der deutsche Logone und seine Nachbargebiete." Von M. Moisel. *With Map.*

Bemerkungen zu den Plänen von Dikoa. Von Leutnant Schipper. *With Plans.*

Madagascar. *Rev. Madagascar* (1905) (2): 298–307. **Hamélius.**

Plantain le Pirate, "Grand Roi de Madagascar" (d'après Clément Downing, son historien). Par E. Hamélius.

J. Plantain, one of the most famous of the Madagascar pirates, was born in Jamaica in 1700.

Madagascar. **Pichot.**

Miss. Catholiques **37** (1905): 449–452, 460–463, 473–475, 485–488, 498–500, 511–512.

Au pays des Antankares. Par le R. P. Paul Pichot. *With Maps and Illustrations.*

Madagascar—Historical. *Rev. de Madagascar* **7** (1905): 2e Sem., 3–14. **Grandidier.**

Voyage de Mayeur dans le Centre de Madagascar, 1758–1787. Par A. Grandidier.

Madagascar—Zoology. *Rev. de Madagascar* **7** (1905): 111–128. **Grandidier.**

Les animaux disparus de Madagascar: gisements, époques et causes de leur disparition. Par G. Grandidier.

Morocco. *B.S.G. Lille* **44** (1905): 251–255. **Déchaud.**

Ports de l'ouest marocain. Extraits sommaires du Rapport de T. Déchaud. *With Map.*

Morocco. **Lemoine.**

Renseignements Colon., Comité Afrique Française (1905): 65–92, 141–155, 157–182.

Mission dans le Maroc Occidental (Automne 1904). Par P. Lemoine. *With Maps and Illustrations.*

Natal. ——

Colony of Natal. Report of the Coal Testing Committee, 1904–05. Maritzburg: P. Davis & Sons, 1905. Size 13 × 8½, pp. 90. *Diagrams and Illustrations.*

Niger. *B.S.G. Com. Paris* **27** (1905): 471–490. ——

Notice sur le moyen Niger.

Nigeria. [**Bedwell.**]

Southern Nigeria. Report for 1904. Colonial Reports, Annual No. 459, 1905. Size 10 × 6, pp. 68. *Diagram. Price* 4½*d.*

Nile. **Kumm.**

Die Beduinenstämme des Nilthals. Statistische Uebersichten zusammengestellt von H. K. W. Kumm. Size 9 × 6, pp. 26.

Réunion. *K.A.W. Amsterdam, P. Sect. Sc.* **7** (1905): 602–610. **Oudemans.**

A Short Account of the Determination of the Longitude of St. Denis (Island of Réunion), executed in 1874. By Prof. J. A. C. Oudemans.

Rhodesia. **Wright and Knight.**

Railways in Rhodesia. A few notes on their construction, and on the country through which they pass. By E. H. Smith Wright. With a description of the Victoria Falls, by E. F. Knight. London, [*not dated*]. Size 10 × 8, pp. 56. *Maps, Illustrations, and Diagram. Presented by the British South Africa Railway.*

Rhodesia.

Rhodesia Chamber of Mines (Incorporated), Bulawayo. Tenth Annual Report for the year ended 31st March, 1905. London, 1905. Size 10 × 8, pp. iv. and 110. *Map.*

Rhodesia—Archæology. *P. Rhodesia Sci. Ass.* **4** (1903–4): 83–86. **Hall.**

Majiri Ruins, Motirikoi (M'Telekwe) Valley. By R. N. Hall. *Plan and Illustrations.*

Rhodesia—Archæology. *P. Rhodesia Sci. Ass.* **5** (1905): 5–7. **White.**

Description of the Lumene Ruins, Gwanda District. By Franklin White. *Plan and Illustrations.*

Rhodesia.—Matopos. *P. Rhodesia Sci. Ass.* **4** (1903–04): 72–76. **Mennell.**

Some Aspects of the Matopos. By F. P. Mennell. *Illustrations.*

Rhodesia—Zimbabwe. *P. Rhodesia Sci. Ass.* **5** (1905): 11–20. **White.**

The Large Elliptical Ruin at Zimbabwe. By Franklin White. *Plan and Illustrations.*

Tunis—Carthage. **Moore.**

Carthage of the Phœnicians in the Light of Modern Excavation. By Mabel Moore. London: W. Heinemann, 1905. Size 8 × 5½, pp. 180. *Illustrations. Price* 6*s. Presented by the Publisher.*

An interesting account of the results of excavations carried out under the direction of the Rev. A. L. Delattre, archpriest of the Cathedral of St. Louis of Carthage.

Uganda. *P. Zoolog. S.* 1905 (2): 184–191. **Delmé-Radcliffe.**

Rough Notes on the Natural History of the Country West of Lake Victoria Nyanza. By Lieut.-Colonel C. Delmé-Radcliffe.

West Africa. **Lugard.**

A Tropical Dependency. An Outline of the Ancient History of the Western Soudan, with an Account of the Modern Settlement of Northern Nigeria. By Flora L. Shaw (Lady Lugard). London: J. Nisbet & Co., 1905. Size 10 × 7, pp. viii. and 508. *Maps. Price* 18*s. net. Presented by the Publishers.* [To be reviewed.]

NORTH AMERICA.

Alaska. *National G. Mag.* **16** (1905): 427–429. **Gilbert.**

Some Notes on the Fox Island Passes, Alaska. By J. J. Gilbert.

On recent survey work by the U.S. Coast and Geodetic Survey.

America—Cartography. **Paltsits.**

Maps illustrating Early Discovery and Exploration in America, 1502–1530. Reproduced by Photography from the original Manuscripts. Issued under the Direction of Dr. E. L. Stevenson. By Victor H. Paltsits. (From the *American Historical Review*, vol. 10, No. 4, pp. 863–867.) Size 10½ × 7.

Account of a fine collection of facsimiles of early maps, including some of the most important productions of the early years of the sixteenth century.

Canada. *T. Canadian I.* **8** (1905): 23–39. **Drummond.**

How Plant Life is Distributed in Canada, and Why. By Dr. A. T. Drummond.

Canada—British Columbia. **Smith.**

Shell-heaps of the Lower Fraser River, British Columbia. By H. I. Smith. ('Publ. Jesup North Pacific Expedition,' vol. 2, part iv. = *Mem. Amer. Museum Nat. Hist.*, vol. 4, part iv.) [New York], 1903. Size 14 × 11, pp. 191. *Illustrations.*

Canada—British Columbia. **Swanton.**

Contributions to the Ethnology of the Haida. By J. R. Swanton. ('Publ. Jesup North Pacific Expedition,' vol. 5, part i. = *Mem. Amer. Museum Nat. Hist.*) Leiden and New York, 1905. Size 14 × 11, pp. 300. *Maps and Illustrations.*

Canada—Historical. **Douglas.**

Old France in the New World. Quebec in the Seventeenth Century. By J. Douglas, LL.D. Cleveland and London: The Burrows Brothers Co., 1905. Size 8½ × 6, pp. 598. *Illustrations. Price* $2.50.

An interesting account of the beginnings of Canadian history under the French, written apparently with full knowledge of the sources of information for the period in question, though some at least of the ground has been covered by previous publications.

Lake Ontario. *T. Canadian I.* **8** (1905): 1–10. **Tully.**

The fluctuations of Lake Ontario. By K. Tully.

Mexico. *B. American G.S.* **37** (1905): 531–543. **Hovey.**

The Western Sierra Madre of the State of Chihuahua, Mexico. By E. O. Hovey. *With Illustrations.*

See note in *Journal* for August, 1905, p. 218, and *ante*, p. 90.

Mexico. *Globus* **88** (1905): 165–167. **Sapper.**

Das mexikanische Territorium Quintana Roo. Von K. Sapper. *With Map.*

Mexico. **Sierra.**

Mexico, its Social Evolution . . . Monumental Inventory summing up in masterly expositions the great progress of the Nation in the Nineteenth Century. . . . Literary Editor: Licentiate Justus Sierra. Translated into English by G. Sentiñón. 2 vols. (in 3). Mexico: J. Ballescá & Co., 1900–1904. Size 17 × 12½, pp. (vol. 1) 778; (vol. 2) 444. *Maps and Illustrations. Presented by the Mexican Minister of Justice.*

United States. *Rev. G.* **55** (1905): 306–309. **Tricoche.**

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Note on the Glacier of Mount Lyell, California. By W. T. Lee. *With Illustrations.*

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Cement Materials and Industry of the United States. By E. C. Eckel. *With Maps.*

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U.S. Geol. Surv., Prof. Paper, No. 32 (1905): pp. 434.

Preliminary Report on the Geology and Underground Water Resources of the Central Great Plains. By N. H. Darton. *Maps, Diagrams, and Illustrations.*

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The Twin Lakes Glaciated Area, Colorado. By L. G. Westgate. *With Map and Illustrations.*

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The Improvement of the Delaware River and Harbor and the Landing Facilities of the Port of Philadelphia. By G. S. Webster. *With Map and Illustrations.*

United States—Early Travels. **Thwaites.**

Early Western Travels, 1748–1846. Edited . . . by Dr. R. G. Thwaites. Vol. 13, Nuttall's Travels into the Arkansa Territory, 1819 (pp. 366). Vols. 14 (pp. 322);

15 (pp. 356); 16 (pp. 292); and 17 (pp. 308), James's Account of S. H. Long's Expedition, 1819–1820. Vol. 18, Pattie's Personal Narrative, 1824–1830; Willard's Inland Trade with New Mexico, 1825, and Downfall of the Fredonian Republic; and Malte-Brun's Account of Mexico (pp. 380). Cleveland, Ohio: The Arthur H. Clark Company, 1905. Size 10 × 6½. *Maps and Illustrations. Price* $4 *net per volume.*

United States—Early Travel. **Wagner.**

Leonard's Narrative. Adventures of Zenas Leonard, Fur Trader and Trapper, 1831–1836. Reprinted from the rare original of 1839. Edited by W. F. Wagner, M.D. Cleveland: The Burrows Brothers Co., 1904. Size 9½ × 6½, pp. 318. *Map. Price* $5.00 *net.*

Leonard was one of the most adventurous of the early thuners and traders who made known the Rocky mountain region in the early part of the nineteenth century. His description of the Yosemite valley is the earliest known.

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Twenty-Fifth Annual Report of the Director of the United States Geological Survey, 1903–4. Washington, 1904. Size 11 × 8, pp. 388. *Maps.*

Includes a report on reclamation-service work.

United States—Historical. **Kaye.**

English Colonial Administration under Lord Clarendon, 1660–1667. By P. L. Kaye, PH.D. (Johns Hopkins University Studies, Series xxiii. Nos. 5, 6.) Baltimore, 1905. Size 10 × 6½, pp. 150.

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Thomas Hutchins. A Topographical Description of Virginia, Pennsylvania, Maryland, and North Carolina. Reprinted from the original edition of 1778. Edited by F. C. Hicks. Cleveland: The Burrows Brothers Co., 1904. Size 10 × 7, pp. 144. *Maps, Plans, etc. Price* 16*s.* 8*d. net.*

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Underground Waters of Eastern United States. M. L. Fuller. (U.S. Geological Survey, Water Supply Paper No. 114.) Washington, 1905. Size 9 × 6, pp. 286. *Maps and Illustrations.*

United States—Indian Territory. **Taff and Bain.**

U.S. Geol. Surv., Prof. Paper No. 31 (1904): pp. 98.

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A particular case of Glacial Erosion. By F. W. Sardeson. *With Diagrams.*

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Drainage features of Central New York. By R. S. Tarr. *With Maps.*

United States—Washington. *Globus* **88** (1905): 254–257. **Bauer.**

Washington, der "Immergrüne Staat," Wirtschafts-geographische Skizze unter Benutzung des amtlichen statistischen Materials. Von F. Bauer.

United States—Wisconsin and New York. *J. Geology* **13** (1905): 363–374. **Hobbs.**

Examples of Joint-controlled Drainage from Wisconsin and New York. By W. H. Hobbs. *With Maps and Illustrations.*

CENTRAL AND SOUTH AMERICA.

Argentine Republic. **Ross.**

Quebracho and Cotton in the Argentine Chaco. Foreign Office, Miscellaneous, No. 639, 1905. Size 9½ × 6, pp. 10. *Price* 1*d.*

Argentine—Cordoba. *B.A. Nacional Cienc. Cordoba* **17** (1904): 383–414. **Doering.**
Resultados Hipsométricos de una Excursión á la Sierra de Córdoba (1901). Por Oscar Doering. *Profiles.*

Brazil. *Sitzb. K.A.W. Wien* **113** *Abt.* 1 (1904): 379–466. **Hussak.**
Ueber das Vorkommen von Palladium und Platin in Brasilien. Von E. Hussak. *With Plates.*

Brazil. **Norzagaray-Elicechea.**
Suggestions and Scheme for Steam Navigation of the Rio Negro, submitted to His Excellency the Governor, and to the Honourable Congress of Amazonas, by L. Norzagaray-Elicechea. Size 8½ × 5½, pp. 160. *Portrait and Diagram. Presented by the Consul-General of Colombia.*
Reviewed November, 1905 (p. 549).

Brazil. **Schmidt.**
Indianerstudien in Zentralbrasilien, Erlebnisse und ethnologische Ergebnisse einer Reise in den Jahren 1900 bis 1901. Von Dr. M. Schmidt. Berlin: D. Reimer (Ernst Vohsen), 1905. Size 10½ × 7, pp. xiv. and 456. *Maps and Illustrations. Price* 10*s.*
Results of ethnological researches among some of the least-known primitive tribes of Brazil. Before starting on his journey, the author had the benefit of the advice of Dr. Karl von den Steinen, and other German authorities on the region of the upper Xingu, whose work he was thus able to continue to the best advantage. The first (and smaller) part of the book describes the author's experiences, the rest being devoted to the ethnological results. The book is well illustrated.

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Abschluss meiner Reisen in den Flussgebieten des Rio Negro and Yapura. Von Dr. T. Koch. *Illustrations.*
The earlier part of the journey was referred to in vol. **26**, p. 89.

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The Climate of the Central American Plateau. By Dr. G. Michaud. *With Illustrations.*

Central America—Mosquito Coast. *Globus* **88** (1905): 91–92. **Neuhaus.**
Zur ethnographischen und archäologischen Untersuchung der Moskitoküste. Von J. Neuhaus.

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Cuba unter der nordamerikanischen Militärregierung und als Republik. Von Prof. Dr. K. Sapper. *With Map.*

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Ts. K. Ned. Aard. Genoots. Amsterdam **22** (1905): 769–780.
Het rapport Havelaar en de toestanden in de Kolonie Curaçao. Door Jhr. L. C. van Panhuys.

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Wilhelm Reiss: Ecuador, 1870–1874. Petrographische Untersuchungen ausgeführt im Mineralogisch-Petrographischen Institut der Universität Berlin. Hefts 1 and 2. Berlin: A. Asher & Co., 1901–1904. Size 13 × 9½, pp. 304.

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Le Canal de Panama. Par F. Kraentzel. *With Map and Section.*

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Le edad de la piedra en Patagonia. Estudio de Arqueología comparada por F. F. Outes. ('An. Museo Nac. Buenos Aires,' **12** (Ser. 3*a*, t. v.), pp. 203–575.) Buenos Aires, 1905. Size 11 × 7½. *Map and Illustrations. Presented by the Author.*

Peru—Mining. *B. Cuerpo Ingen. Minas Perú*, No. 24 (1905): pp. 64. **Denegri.**
Estadistica minera del Perú en 1904. Por M. A. Denegri.

South America—Ethnology. *Globus* **88** (1905): 101–108. **Nordenskiöld.**
Ueber Quichua sprechende Indianer an den Ostabhängen der Anden im Grenzgebiet zwischen Peru und Bolivia. Von E. Nordenskiöld. *With Map and Illustrations.*

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A Historical Geography of the British Colonies. By C. P. Lucas, C.B. Vol. 2. The West Indies. Second Edition, revised and brought up to date by C. Atchley, Librarian of the Colonial Office. Oxford: Clarendon Press, 1905. Size 7½ × 5½, pp. 348. *Maps. Price 7s. 6d. Presented by the Publishers.*

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Sage über die Entstehung der Inseln Map und Rumung und der Landschaft Nimigil (Japinseln). Von A. Senfft.

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Die Marianen. Von Hermann H. L. W. Costenoble. *Illustrations.*

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New Guinea—German. *Globus* **88** (1905): 69–72. **Parkinson.**
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New South Wales—Meteorology. **Russell.**
Results of Meteorological Observations in New South Wales during 1900, 1901, and 1902. Under the direction of H. C. Russell. Sydney, 1904. Size 9½ × 6, pp. 216.

New Zealand. **Heim.**
Neuseeland. Zwei Vorträge gehalten von Dr. Alb. Heim. (Neujahrsblatt der Naturforschenden Gesellschaft in Zürich auf das Jahr 1905; 107 Stück.) Zürich. Size 11 × 9, pp. 42. *Plate and Illustrations.*
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Long Water (Whangaroa). A Sketch in the North of north Island of New Zealand. By H. Mason. *With Illustrations.*

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Notes from my South Sea Log. By L. Becke. London: T. Werner Laurie, [*not dated*]. Size 8 × 5½, pp. vi. and 352. *Map and Portrait. Price 6s. net. Presented by the Publisher.*
Tales of adventure, and sketches of life among the Pacific islanders, from log-books kept by the author while supercargo in the South seas.

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Sprachen und Sprachgebiete in Deutsch-Mikronesien. Von H. Seidel.

Queensland. ———
Statistics of Queensland, 1904. Brisbane, 1905. Size 13½ × 8½, pp. xii. and 456. *Presented by the Government Statistician.*

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POLAR REGIONS.

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Two Years in the Antarctic. Being a Narrative of the British National Antarctic Expedition. By Lieut. A. B. Armitage. London: E. Arnold, 1905. Size 9 × 6, pp. xx. and 316. *Map and Illustrations. Price* 15*s. net. Presented by the Publisher.*

Reviewed in the December number (p. 666).

Antarctic. **Mill.**

The Siege of the South Pole: the Story of Antarctic Exploration. Dr. H. R. Mill. London: Alston Rivers, 1905. Size 9 × 6, pp. xvi. and 456. *Maps and Illustrations. Price* 7*s.* 6*d. net. Presented by the Publisher.*

See review in the December number (p. 665).

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Streitfragen der antarktischen Klimatologie. Von W. Krebs. *With Maps.*

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Rapport préliminaire de l'expédition antarctique française. Par J. B. Charcot. *With Map.*

Arctic. *B.S.G. Marseille* **29** (1905): 88–96. **Marcillac**

Projet d'exploration aérostatique au Pôle Nord. Par P. Marcillac.

Greenland—Eskimo. *Petermanns M.* **51** (1905): 186–187. **Steensby.**

Die Einwanderung der Eskimos nach Grönland. Von H. P. Steensby.

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A. Faustini. Le Campagne Baleniere nella Storia delle Scoperte Polari (Estratto dalla Rivista di Fisica, Matematica, e Scienze Naturali, Anno v., 1904). Pavia, 1904. Size 9½ × 6½, pp. 12.

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Die Reformation der Kartographie um 1900. Von C. Sandler. München und Berlin: R. Oldenbourg, 1905. Size 13 × 9½, pp. 30; *Maps* (separate), size 24 × 15. *Price* 20*m. Presented by the Publisher.* [To be reviewed.]

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Das Erdsphäroid und seine Abbildung. Von Hermann Wagner.

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Sulla scoperta della Bussola nautica e sulla storia della Repubblica Amalfitana Del Cap. Umberto Moretti.

Longitude Determination. *Petermanns M.* **51** (1905): 140–141. **Hammer.**

Genauigkeit der Längenunterschiedsbestimmung durch Uhrtransport auf der Eisenbahn und dem Schiffe. Von Prof. Dr. E. Hammer.

Mathematical Geography. *Petermanns M.* **51** (1905): 121–124. **Graber.**

Das "Orthogonal Tellurium" und die Konstruktive Lösung von Aufgaben aus dem Gebiet der mathematischen Geographie. Von Dr. H. V. Graber. *With Diagrams.*

On an instrument designed by the author as an aid in the teaching of mathematical geography.

Mathematical Geography. *Monthly Weather Rev.* **33** (1905): 242–248. ——

Improved Methods for finding Altitude and Azimuth, Geographical Position, and the Variation of the Compass. *With Illustrations.*

Surveying. **Finsterwalder.**

Abh. Math. Phys. Klasse K. Bayerischen A.W. **22** (1904): 223–260.

Eine Grundaufgabe der Photogrammetrie und ihre Anwendung auf Ballonaufnahmen. Von S. Finsterwalder. *With Illustrations.*

Surveying. *M.K.K. Militärg. I.* **24** (1904): 143–180. **Hübl.**

Beiträge zur Stereophotogrammetrie. Von A. Freiherrn von Hübl. *With Diagram.*

Surveying. *M. aus den Deuts. Schutzgebeiten.* **18** (1905): 162–178. **Kurtz.**

Eine Erweiterung des Böhlerschen Basismessverfahrens. Von Kapitänleutnant Kurtz. *With Illustrations.*

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Geological Studies. **Sollas.**

The Age of the Earth and other Geological Studies. By W. J. Sollas. London: T. Fisher Unwin, 1905. Size 9 × 6, pp. xvi. and 328. *Illustrations. Price* 10*s.* 6*d. net. Presented by the Publisher.*

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An Introduction to Geology. By J. E. Marr, SC.D., F.R.S. Cambridge University Press, 1905. Size 7½ × 5, pp. viii. and 230. *Illustrations. Price* 3*s. net. Presented by the Publishers.*

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A Treatise on Metamorphism. By C. R. Van Hise. *With Illustrations.*

Geomorphology. *J. of T. Victoria I.* **37**(1905): 214–221. **Hull.**

On Dr. Nansen's Bathymetrical Researches in the Arctic Ocean as compared with those on the Atlantic Coast of Europe. By Prof. E. Hull. *Map.*

Glaciers. *M. Deuts. und Oesterr. Alpenv.* (1905): 187–189, 201–203. **Angerer.**

Berichte über die wissenschaftlichen Unternehmungen des D. u. O. A. V., xl. Gletscherbeobachtungen im Ankogel—Hochalpenspitzgebiete in den Jahren 1898 bis 1904. Von Dr. Hans Angerer.

Geophysics. *C.R.* **141** (1905): 693–695. **Brunhes and Baldit.**

Sur la dissymétrie de la déperdition electrique en pays de montagne: rôles comparés de l'altitude et du relief. Note de B. Brunhes et A. Baldit.

Hydrology. *G.Z.* **11** (1905): 436–445. **Brückner.**

Die Bilanz des Kreislaufs des Wassers auf der Erde. Von Prof. Dr. E. Brückner.

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The Gauging of Streams by Chemical Means. By C. E. Stromeyer. *With Sections.*

Meteorology. *P. American Philosoph. S.* **44** (1905): 159–163. **Dallas.**

Enquiry into the Pressure and Rainfall Conditions of the Trades-monsoon Area. By W. L. Dallas.

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Oscillations of the Solar Activity and the Climate. By Dr. C. Easton. *With Diagram.*

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Zur Periodizität der solaren und klimatischen Schwankungen. Von Dr. C. Easton. *Chart.*

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Sehr tiefe Temperaturen in grossen Höhen der Atmosphäre. Von R. Nimführ.

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Die Verteilung des Niederschlags nach den geographischen Breiten. Von J. Bezdek. (*Földr. Közl.* **23** (1904): 283–287. *Map.*)

Meteorology—Temperature. **Hann.**

Der tägliche Gang der Temperatur in der inneren Tropenzone. Von J. Hann. Wien: Karl Gerold's Sohn, 1905. Size 19½ × 10, pp. 118. *Presented by the Author.*

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Ueber die Temperaturabnahme mit der Höhe bis zu 10 km. nach den Ergebnissen der internationalen Ballonaufstiege. Von J. Hann.

Oceanography. **Sandström.**

Conseil Perm. Internat. Explor. Mer., Publ. Circonstance **18** (1904): pp. 6.

Einfluss des Windes auf die Dichte und die Bewegung des Meereswassers. Von J. W. Sandström.

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An Apparatus for the Collection of Bottom-samples. By V. W. Ekman. (Conseil Permanent pour l'Exploration de la Mer. Publications de Circonstance, No. 27.) Copenhagen, 1905. Size 10 × 7, pp. 6. *Illustration.*

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Kurze Beschreibung eines Propell-Strommessers. Von V. W. Ekman (pp. 4). Beschreibung des Bifilar-Strommessers. Von O. Pettersson (pp. 6). Prüfung von Strommessern und Strommessungsversuche in der Nordsee. Von A. M. van Roosendaal und C. H. Wind (pp. 10). (Conseil Permanent International pour l'Exploration de la Mer. Publications de Circonstance, Nos. 24–26.) Copenhagen, 1905. Size 10 × 7. *Plates.*

Oceanography—Currents. **Lenehan.**

Current Papers, No. 8. By H. A. Lenehan. Size 8½ × 5½, pp. (12). *Charts.*

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Ueber die innere Reibung des Seewassers. Von O. Krümmel und E. Ruppin. Kiel, 1905. Size 13 × 10½, pp. (10).

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Oberflächentemperaturen im südlichen Indischen Ozean, 1901–1903. Inaugural-Dissertation zur Erlangung der Doktorwürde . . . von Rudolf Lütgens. Berlin, 1905. Size 10½ × 7½, pp. 16. *Maps and Diagrams. Presented by the Author.*

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A Classification of Rivers based on Water-supply. By Isaiah Bowman.

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An Enquiry into the nature of the relationship existing between Sun-spot frequency and Terrestrial Magnetism. By Dr. C. Chree.

Volcanic Phenomena. *Globus* **88** (1905): 234–238, 249–253. **Hundhausen.**

Beobachtungen aus verschiedenen vulkanischen Gebieten. Von Dr. J. Hundhausen. *With Map and Illustrations.*

Observations in the Yellowstone, New Zealand, Hawaii, etc.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Anthropogeography. *G. Teacher* **3** (1905): 125–131. **Semple.**

Mountain Peoples in Relation to their Soil. A Study in Human Geography. By E. C. Semple.

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The Distribution of Rural Occupations. *With Map.*

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The Old Colonial System. By G. B. Hertz. Manchester: University Press; London: Sherratt and Hughes, 1905. Size 9½ × 6, pp. xii. and 232. *Price 5s. net. Presented by the Publishers.*

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Commercial—Caoutchouc. *B. Economique* **8** (1905): 735–742. **Brenier and Claverie.**

La Production et la Consommation mondiales du Caoutchouc. Par H. Brenier et F. Claverie.

Commercial Geography. **Smith.**

The Organization of Ocean Commerce. By J. Russell Smith, PH.D. (Publ. University of Pennsylvania. Series in Political Economy and Public Law No. 17.) Philadelphia: Published for the University, 1905. Size 10½ × 6½, pp. viii. and 156. *Map. Presented by the University of Pennsylvania.*

Reviewed in vol. **26** (p. 552).

Commercial—Ground-nut. *Z. Kolonialpolitik* **7** (1905): 620–626. **Block.**

Ueber die geographische Verbreitung der Erdnuss und ihre Bedeutung als Nahrungsmittel. Von J. Block.

Commercial—Routes. *M.K.K.G. Ges. Wien* **48** (1905): 384–389. **Fischer.**

Ueber die neuen Verbindungen der Austro-Americana zwischen Triest—New York und Triest—Zentralamerika. Von E. S. Fisher.

Commercial—Tin. **Fawns.**

Tin Deposits of the World. By S. Fawns. London: The Mining Journal, 1905. Size 9 × 6, pp. xii. and 240. *Maps and Illustrations. Presented by the Publishers.*

A useful summary of tin-mining throughout the world, with descriptions of the geological formations in which the deposits occur in the various countries, the methods of working, and an outline of the statistics of production.

Economic Geography—Agriculture. **Freidrich.**

Die Entwickelung des Pflanzenbaues. Von E. Friedrich. (Friedrich Ratzels Gedächtnis, 1904, pp. 79–122.)

Ethnology—Jesup Expedition. **Boas.**

Publications of the Jesup North Pacific Expedition. Edited by Franz Boas. [vol. 1] 1898–1900 (pp. 454); [vol. 2] parts i.–iv.; [vol. 3] parts i. and ii.; [vol. 4] part i.; [vol. 6] part. i.; [vol. 7] part. i. (= *Mem. Amer. Museum Nat. Hist.*, New York). New York and Leiden, 1900–1905. Size 14 × 11. *Maps and Plates.*

Vol. **4**, part i., deals with the decorative art of the Amur tribes; Vol. **7**, part i., with the material culture of the Chukchis; the rest treat of the Indians of British Columbia and adjoining regions.

Historical.

Atti del Congresso Internazionale di Scienze Storiche (Roma, 1–9 Aprile, 1903). Vol. **10**. Atti della Sezione VI.: Storia della Geografia, Geografia Storica. Rome: E. Loesher, 1904. Size 10 × 6½, pp. xxvii. and 313. *Price 8 fr. Presented by the Publisher.*

Includes a number of interesting papers on the historical side of geography, the most important of which are entered in the Literature of the Month under their special headings.

Historical. *B.S. Khédiv. G.* **6** S. (1905): 417–434. **Salem Bey.**

Les voyageurs musulmans. Par Mahmoud Salem Bey.

Historical. *Riv. G. Italiana* **12** (1905): 284–290. **Bruzzo.**

Di Fracanzio da Montalboddo, e della sua Raccolta di Viaggi. Del Prof. Giuseppe Bruzzo.

Fracanzio (sometimes spoken of as Fracanzano) was the compiler of the 'Paesi novamente retrovate' (1507).

Historical. ——

Epistola serenissimi Regis Portugalie ad Julium papam Secŭdum de Victoria cŏtra infideles habita. Paris, 1507. [Reproduction; Lisbon, 1905.] Size 8½ × 6, pp. [8]. *Presented by Señor Eugenio do Canto.*

Account of sea-fights waged by the Portuguese in the early days of their Eastern empire.

Historical. **Marcel.**

Lettres inédites du Cardinal Passionei à d'Anville. Par G. Marcel. (Extrait du *B.G. hist. et descriptive*, No. 3, 1904.) Paris: Imp. Nationale, 1905. Size 9½ × 6¼, pp. 24. *Presented by the Author.*

A collection of fifteen letters from the Cardinal to D'Anville, lately brought to light, bears witness to the perseverance and industry of the cartographer in collecting information on the progress of geographical knowledge.

Historical. **Grande.**

Stefano Grande. Le Carte d'America di Giacomo Gastaldi. Contributo alla storia della cartografia del secolo XVI. Torino: C. Clausen, Hans Rinck, Succ., 1905. Size 10 × 6½, pp. 166. *Facsimile Maps. Presented by the Publisher.*

Historical—Hanseatic League. **Daenell.**

Zur hansischen Schiffahrt im Mittelalter. Von E. Daenell. (Friedrich Ratzels Gedächtnis, 1904, pp. 23–38.)

Historical—Vespucci. *Riv. G. Italiana* **12** (1905): 308–311. **Uzielli.**

A proposito della medaglia in onore del Vespucci. Di Gustavo Uzielli.

BIOGRAPHY.

Bembo. *Atti Congresso Internat. Sc. Storiche*, 1903, **10** (1904): 55–68. **Günther.**

Il Cardinale Pietro Bembo e la Geografia. Del Prof. Dott. S. Günther.

Bertelli. *Riv. G. Italiana* **12** (1905): 193–203, 340–350. **Baratta.**

L'opera scientifica del P. Timoteo Bertelli (1826–1905). Appunti di M. Baratta. *With Portrait.*

Bertelli dealt chiefly with the history of the compass and terrestrial magnetism.

Brazza. *La G., B.S.G. Paris* **12** (1905): 200–202. **Rabot.**

Savorgnan de Brazza. Par C. Rabot. *With Portrait.*

Filicaja. *Atti Congresso Internat. Sc. Storiche*, 1903, **10** (1904): 39–54. **Gorrini.**

Un viaggiatore italiano nel Brasile; Baccio da Filicaja (1565–1609). Del Dott. Giacomo Gorrini.

Light. ——

Colonel Light, the Founder of Adelaide. Unveiling of Memorial, 1905. Size 9½ × 7, pp. 28. *Portrait and Illustrations.*

See note in the December number.

Megiser. **Hantzsch.**

Hieronymus Megiser, ein Leipziger Geograph vor 300 Jahren. Von V. Hantzsch. (Friedrich Ratzels Gedächtnis, 1904, pp. 123–140.)

Philippi. **Arana.**

El Doctor Don Rodolfo Amando Philippi, su vida i sus obras. Por Diego Barros Arana. Santiago de Chile, 1904. Size 10 × 7, pp. viii. and 248. *Portraits. Presented by the Author.*

Reclus. **Magistris.**

L. F. de Magistris. Elisco Reclus (1830–1905). Iesi, 1905. Size 9 × 6½, pp. 40. *Presented by the Author.*

Reclus. *La G., B.S.G. Paris* **12** (1905): 81–86. **Schrader.**

Élisée Reclus. Par F. Schrader. *With Portrait.*

Sowerbutts. *J. Manchester G.S.* **20** (1904): 181–182. ——

Eli Sowerbutts. *With Portrait.*

Richter. *Riv. G. Italiana* **12** (1905): 274–283, 351–368. **Marinelli.**

L'opera geografica di Edoardo Richter. Appunti di O. Marinelli.

Wallace.

My Life: A Record of Events and Opinions. By A. R. Wallace. 2 vols. London: Chapman & Hall, 1905. Size 9 × 6, pp. (vol. 1) xii. and 436; (vol. 2) viii. and 460. *Maps and Illustrations. Price 25s. net. Presented by the Author.*

The extent and importance of Dr. Wallace's travels gives this autobiography a special interest to geographers.

Ziegler. *National G. Mag.* **16** (1905): 355–357.

Mr. William Ziegler. *With Portrait.*

GENERAL.

Almanac. **Kettle and Jenkins.**

Pearson's Nautical Almanack and General Tide Tables, 1906. Edited by W. R. Kettle and H. D. Jenkins. London: Imray & Co. Size 9 × 6, pp. 392. *Price* 1*s. Presented by the Publishers.*

Bibliography. **Raveneau.**

Annales de Géographie. XIV^e^ Bibliographie Géographique Annuelle, 1904. Publiée sous la direction de Louis Raveneau. Paris: A. Colin, [1905]. Size 10 × 6½, pp. 336.

Borneo and West Africa. **Cator.**

Everyday Life among the Head Hunters and other experiences from East to West. By Dorothy Cator. London: Longmans & Co., 1905. Size 8 × 5½, pp. xiv. and 212. *Illustrations. Price 5s. net. Presented by the Publishers.*

The author has resided, as the wife of a Government official, both in North Borneo and West Africa, and gives an interesting insight into the everyday life, with its numberless trials and vexations, of those who uphold British influence in the remote corners of the Empire. There is also some account of the Borneo natives.

Coins. **Macdonald.**

Catalogue of Greek Coins in the Hunterian Collection, University of Glasgow. Vol. 3. Further Asia, Northern Africa, Western Europe. By G. Macdonald, LL.D. Glasgow: J. Maclehose & Sons, 1905. Size 12 × 9, pp. vi. and 800. *Plates. Presented by the Trustees of the Hunterian Coin Catalogue Fund.*

Descriptive Geography. **Reclus.**

Histoire d'une Montagne. Par É. Reclus. Nouvelle édition. Paris: J. Hetzel et Cie., [*not dated*]. Size 7½ × 5, pp. 306. *Illustrations. Price* 3 *fr.*

Descriptive Geography. **Reclus.**

Histoire d'un Ruisseau. Par É. Reclus. 18th edition. Paris: J. Hetzel, [*not dated*]. Size 7½ × 5, pp. 316. *Illustrations. Price* 3 *fr.*

These two works are, in spite of their small compass, among the masterpieces of their author, bringing out in a way that has never been excelled the importance of geography as a stimulus to the imaginative and poetical faculties. They treat, not only of the physical processes involved in the history of mountain and stream, but of the influence exercised by them on the life of the dwellers in their neighbourhood.

Educational.

Board of Education, Whitehall, London, S.W. Regulations for Secondary Schools. Geography. Size 13¼ × 8½, pp. 4.

Educational—Text-book. **Herbertson.**

The Oxford Geographies. Vol. 2. The Junior Geography. By A. J. Herbertson, PH.D. Oxford: Clarendon Press, 1905. Size 7½ × 5, pp. 288. *Maps. Price 2s. Presented by the Publishers.*

This excellent text-book keeps in view throughout the influence on geographical facts of physical conditions, a clear comprehension of which is made the basis of the whole teaching. It is intended to embrace so much of regional geography as is necessary for the Oxford Junior Local Examinations.

Geography. *G. Teacher* **3** (1905): 97–103. **Dann.**

What is Geography? By E. W. Dann.

Instructions to Travellers. **Neumayer.**

Anleitung zu wissenschaftlichen Beobachtungen auf Reisen . . . herausgegeben von Prof. Dr. G. von Neumayer. 3 Aufl., Lief. i.–iv. Hanover: Dr. M. Jänecke, 1905. Size 9 × 6. *Presented by the Publisher.*

Mountains. **Grand-Carteret.**

John Grand-Carteret. La Montagne à travers les ages. II. La Montagne d'aujourd'hui. Grenoble: C. Dumas, 1904. Size 11 × 9, pp. 494. *Illustrations. Price* 25*s.*

The first volume appeared in 1903 (*Journal*, vol. 21, p. 481). The work is now complete, and forms a history of mountains from the standpoint of their influence on mankind from the earliest days to the present.

Nomenclature. **De la Blache.**

Atti Congresso Internat. Sc. Storiche, 1903, **10** (1904): 11–17.

De la signification populaire des noms de pays. Del Prof. P. Vidal de la Blache.

Stieler's Hand-Atlas. *Petermanns M.* **51** (1905): 137–139. **Habenicht.**

Stieler's Hand-Atlas, ein Kompendium der Erdmessungen des vorigen Jahrhunderts. Von H. Habenicht. *With Maps.*

The map of Africa in the newest issue is shown side by side with that in the first edition (1820).

Telegraphs. *Monthly Rev.* **21** (1905): 104–110. **Bright.**

Imperial Consolidation by Telegraphy. By C. Bright.

World. **Moncrieff.**

The World of To-day: A Survey of the Lands and Peoples of the Globe as seen in Travel and Commerce. By A. R. Hope Moncrieff. Vol. 3. London: The Gresham Publishing Co., 1905. Size 11 × 7½, pp. vi. and 280. *Maps and Illustrations. Price* 8*s. net. Presented by the Publisher.*

This volume deals with Africa.

Year-Book. **Wagner.**

Geographisches Jahrbuch, xxvii. Band 1904. Herausgegeben von Hermann Wagner. Gotha: J. Perthes, 1905. Size 8½ × 5½, pp. viii. and 466. *Price* 15 *Marks.*

This part deals with recent progress in the study of the structure of the Earth's crust, and in the geography of special regions (Polar, Russian Asia, and North America).

OLDER WORKS ADDED TO THE SOCIETY'S COLLECTIONS IN 1905.

BOOKS.

Anania, Lorenzo d'.—L'Universale Fabrica del Mondo. Size 9 × 6½. *Venice*, 1582.

Apianus, P.—Cosmographia, corregida y añadida por Gemma Frisio. *Maps and Diagrams.* Size 8½ × 6. *Antwerp*, 1575.

Barrington, Hon. Daines.—Miscellanies. *Maps and Plate.* Size 11 × 9. *London*, 1781.

[Includes, besides the tracts on the North Pole and on Other's voyage, a translation of Maurelle's voyage in the South Seas.]

Bartoli, Cosimo.—Del Modo di misurare le distantie, le superficie, i corpi, le piante, le provincie, le prospettive, etc. *Diagrams.* Size 9 × 6½. *Venice*, 1589.

Beamish, N. L.—The Discovery of America by Northmen in the Tenth Century, with notices of the Early Settlements of the Irish in the Western Hemisphere. *Maps and Illustration.* Size 9 × 5½. *London*, 1841.

Bordone, Benedetto.—Isolario. *Maps, Plans, etc.* Size 12 × 8½. *Venice*, 1547.

Bosworth, Rev. J.—King Alfred's Anglo-Saxon Version of the Compendious History of the World by Orosius. *Maps and Plates.* Size 10 × 6½. *London*, 1859.

Bouchette, Joseph.—A Topographical Description of the Province of Lower Canada, with Remarks upon Upper Canada, etc. *Maps, Plans, Illustrations, and Portrait.* Size 10 × 6. *London*, 1815.

Boulton, D'Arcy.—Sketch of His Majesty's Province of Upper Canada. *Map.* Size 11 × 8½. *London*, 1805.

Brandan, St.—Les Voyages Merveilleux de Saint Brandan à la recherche du Paradis Terrestre, . . . avec Introduction par Francisque Michel. Size 7½ × 5. *Paris*, 1878.

Cartier.—Voyage de Jaques Cartier au Canada en 1534. Nouvelle édition, publiée . . . par M. H. Michelant. Documents Inédits . . . communiqués par M. Alfred Ramé. *Maps.* Size 7½ × 5. *Paris*, 1865.

Casas, Bartolome de las.—Brevissima Relacion de la Destruycion de las Indias. Size 8 × 5½. Seville, 1552. [*Barcelona*, 1646.]

Cellarius, Ch.—Christophori Cellarii smalcaldiensis Geographia Antiqua juxta et Nova. Size 5½ × 3½. *Jena*, 1687.

Cunningham, Alex.—The Ancient Geography of India. I. The Buddhist Period. *Maps.* 8vo. *London*, 1871.

Danti, Egnatio.—Trattato dell' Uso et della Fabbrica dell' Astrolabio. *Diagrams.* Size 8½ × 6. *Florence*, 1569.

D[apper], Dr. O.—Die Unbekante Neue Welt; oder Beschreibung des Weltteils Amerika, und des Süd-Landes. *Maps and Illustrations.* Size 13 × 8. *Amsterdam*, 1673.

Froger, Le Sieur.—Relation d'un Voyage fait en 1695, 1696, et 1697, aux Côtes d'Afrique, Détroit de Magellan, Brésil, Cayenne et Isles Antilles. *Maps, Plans, and Illustrations.* Size 6½ × 3½.

Ghillany, Dr. F. W., and Alexander von Humboldt.—Geschichte des Seefahrers Ritter Martin Behaim nach den ältesten Urkunden bearbeitet. Eingeleitet durch eine Abhandlung: Ueber die ältesten Karten des Neuen Continents und den Namen Amerika. *Maps and Plates.* Size 14 × 12. *Nürnberg*, 1853.

Giustiniani, Ag.—Castigatissimi annali della republica di Genoa. [*First 4 pp. missing.*] Size 11½ × 8. *Genoa*, 1537.
[Contains one of the earliest memoirs of Columbus.]

Glareanus, H.—Henrici Glareani Helvetii, Poetæ Laureati, de Geographia Liber Unus. *Diagrams.* Size 8 × 6. *Freiburg im Breisgau*, 1533.

Gonzalez, Rev. Anthonius.—Hierusalemsche Reyse. . . . 2 vols. *Maps and Illustrations.* Size 8 × 6. *Antwerp*, 1673.

Gunter, E.—The Works of Edmund Gunter; containing the Description of the Sector, Cross-staff, and other instruments. . . . .The Third Edition. *Diagrams.* Size 7 × 5½. *London*, 1653.

[Herberstein, Baron S. von].—Rerum Moscoviticarum Commentarij. [*Map missing.*] Size 6½ × 4. *Antwerp*, 1557.

Heriot, George.—Travels through the Canadas, containing a Description of the Picturesque Scenery on some of the Rivers and Lakes; with an Account of the Productions, Commerce, and Inhabitants of those Provinces. *Map and Plates.* Size 11 × 8½. *London*, 1807.

Honter, J.—Rudimentorum Cosmographicorum Joan. Honteri Coronensis libri III., cum tabellis Geographicis elegantissimis. *Maps and Diagrams.* Size 6½ × 4. [*Zürich*], 1583.

Huttich and Grynaeus.—Novus Orbis Regionum ac Insularum veteribus incognitarum. Size 12½ × 8. *Basle*, 1537.

Huttich, Grynaeus, and Varrerius.—Novus Orbis, id est, Navigationes Primae in Americam: quibus adjunximus, Gasparis Varrerii discursum super Ophyra Regione. . . . Size 6 × 3½. *Rotterdam*, 1616.

[Jefferys, Thomas].—The Natural and Civil History of the French Dominions in North and South America. *Maps and Plans.* Size 14 × 9. *London*, 1761.

[Jefferys, Thomas].—A Description of the Spanish Islands and Settlements on the Coast of the West Indies. *Maps and Plans.* Size 10 × 8. *London*, 1762.

Kolbe, Peter.—Naaukeurige en Uitvoerige Beschryving van de Kaap de Goede Hoop. 2 vols. *Maps and Plates.* Size 17 × 11½. *Amsterdam*, 1727.

Lasar a Varea, Alphonsus.—Universus Terrarum Orbis Scriptorum Calamo Delineatus. 2 vols. (in one). *Maps, Plans, etc.* Size 14 × 9½. *Padua*, 1713.

Lilius, Z.—Zachariæ Lilii Vicetini Orbis Breviarium. *Diagrams.* Size 8½ × 6. [*Venice, circ.* 1495-9.]

Linschoten, Jan Huyghen van.—Itinerarium ofte Schip-vaert naer Oost ofte Portugael Indien. . . . *Maps and Illustrations.* Size 13 × 8. *Amsterdam*, 1623.

L[odewyk], G. M. A. W.—Prima Pars Descriptionis Itineris Navalis in Indiam Orientalem. [Houtman's voyage.] *Maps and Illustrations.* Size 13½ × 10. *Amsterdam*, 1598.

Mangoni, Rosario.—Ricerche Topografiche ed Archeologiche sull Isola di Capri, da servire de Guida á viaggiatori. *Map.* Size 7 × 4. *Naples*, 1834.

Morisotus, Claudius Bartholomæus.—Orbis Maritimi sive Rerum in Mari et Littoribus gestarum Generalis Historia. . . . *Maps and Illustrations.* Size 13 × 8. *Divione (Dijon)*, 1643.

Munster, Sebastian.—Kosmographia. [German version.] *Maps and Illustrations.* Size 15½ × 9½. *Basle*, 1628.

Ogilby, John.—A Relation of Remarkable Passages in two Embassies from the East India Company of the United Provinces to . . . China. 2 vols. *Maps and Illustrations.* Size 16½ × 10½. *London*, 1671–1673.

Ptolemy.—Ptolemæus Auctus, Restitutus, Emaculatus, cum tabulis veteribus ac novis. *Maps.* Size 18½ × 12. [*Strassburg*], 1520.

Ptolemy and Berlingheri.—Geographia di Francesco Berlinghieri, Fiorentino, in Terza Rima et Lingua Toscana distincta. *Maps.* Size 17 × 11. *Florence*, [*circ.* 1482].

Ptolemy and Bertius.—Theatrum Geographiæ Veteris. *Maps.* Size 17 × 11. *Amsterdam*, 1618.

Ptolemy and Ruscelli.—La Geografia di Claudio Tolomeo, Alessandrino; Nuovamente tradotta di Greco in Italiano, da Girolamo Ruscelli. *Maps.* Size 9½ × 6. *Venice*, 1561.

Ptolemy and Magini.—Geographiæ Universæ tum Veteris, tum Novæ Absolutissimum opus. *Maps.* Size 8 × 6. *Bologna*, 1608.

Quadus, Matthias.—Fasciculus Geographicus complectens praecipuarum Totius Orbis Regionnum Tabulas circiter centum. *Maps.* Size 11 × 8. *Cologne*, 1608.

Rogers, Capt. Woodes.—A Cruising Voyage round the World. *Maps.* Size 7½ × 4½. *London*, 1712.

Sadeur, Jacques.—Les Avantures de . . . , dans la Découverte et le Voiage de la Terre Australe. [*Fictitious.*] Size 6½ × 3½. *Paris*, 1692.

Sagri, N.—Ragionamenti sopra le Varieta dei Flussi et Riflussi del Mare Oceano Occidentale. *Diagrams.* Size 8 × 5½. *Venice*, 1574.

Salmon, T.—Modern History, or the Present State of all Nations. Illustrated . . . by Hermann Moll. 3 vols. Size 10½ × 8½. *Maps and Plates.* *London*, 1739.

[Senex, John.]—A Treatise of the Description and Use of both Globes. Size 6½ × 3½. *London*, 1718.

Stoeffler, J.—Elucidatio Fabricæ Ususque Astrolabii. *Diagrams.* Size 7 × 4½. *Paris*, 1564.

Strahlenberg, Philipp Johann von.—Das Nord- und Ostliche Theil von Europa and Asia. *Map and Plates.* Size 9½ × 7. *Stockholm*, 1730.

Struys, J.—The Voinges and Travels of John Struys through Italy, Greece, Muscovy, Tartary, Media, Persia, East India, Japan, and other Countries in Europe, Africa, and Asia. . . . Done out of Dutch, by John Morrison. *Map and Plates.* Size 9 × 6½. *London*, 1684.

Thevenot, M.—Relations de divers Voyages curieux . . . Nouvelle Edition; augmentée de plusieurs Relations curieuses. 2 vols. *Maps and Illustrations.* Size 14 × 9. *Paris*, 1696.

Uring, Captain N.—A History of the Voyages and Travels of Captain Nathaniel Uring. *Maps.* Size 8 × 4½. *London*, 1726.

Veer, Gerrit de.—Diarium Nauticum, seu Vera Descriptio trium Navigationum . . . ad Septentrionem. *Maps and Illustrations.* Size 13½ × 10. *Amsterdam*, 1598.

Whitehead, John.—Exploration of Mount Kina Balu, North Borneo. *Plates and Illustrations.* Size 14½ × 10. *London*, 1893.

Wilkins, John.—A Discourse concerning a New World and another Planet. *Diagrams.* Size 6½ × 4. *London*, 1640.

Wytfliet, Cornelius.—Descriptionis Ptolemaicæ Augmentum. *Maps.* Size 12 × 7½. *Louvain*, 1597.

Zamberto, Bartolommeo.—[Isolario, o Carte del Mare Egeo.] (Title and some ll. missing.) *Charts.* Size 9½ × 7. [*Venice, circ.* 1480.]

Zucchelli, Padre Antonio.—Relazione del Viaggio e Missione di Congo nell' Etiopia Inferiore Occidentale. Size 9 × 6½. *Venice*, 1712.

Zurla, Placido.—Il Mappamondo di Fra Mauro, Camaldolese. . . . *Map.* Size 13 × 9½. *Venice*, 1806.

North American Boundary.—Parts i. and ii. Correspondence relating to the Boundary between the British Possessions in North America and the United States of America, under the Treaty of 1783. *Maps and Diagrams.* *London*, 1840.

——— —Supplemental Reports relating to the Boundary . . . [as above]. *Map and Diagram.* (Bound in 1 volume. Size 13½ × 8½.) *London*, 1842.

ATLASES AND MAPS.

Alagna, Giacomo.—A compleat set of new charts . . . , containing an accurate survey of the coast of Portugal and the Mediterranean. *London*, 1764.

Arrowsmith, A.—Map of Asia. *London*, 1810.

——————— —Map of Scotland, constructed from original materials. *London*, 1810.

Blaeu, J., Nicholas Visscher, and Fred de Wil.—Atlas minor. *Amsterdam*, [*no date*].

Cellarius, A.—Harmonia macrocosmica sev Atlas universalis et novus totius universi creati, cosmographiam generalem et novam exhibens. *Amsterdam*, 1661.

C., M., and M. Gueudeville.—Atlas historique, ou nouvelle introduction à l'histoire, à la chronologie et à la géographie ancienne et moderne. Par M. C. . . . avec des dissertations par M. Gueudeville. 7 vols. *Amsterdam*, 1718–20.

Horwood, R.—Plans of London. *London*, 1729.

Jefferys, John.—A new map of all the rivers of England and Wales. *Westminster*, 1744.

Jefferys, Thomas.—The East Indies, with the roads. 2nd edit. *London*, 1768.

Kunstmann, Friederich, Karl von Spruner, and George M. Thomas.—Atlas zur Entdeckungsgeschichte Amerikas. *Munich*, 1859.

Magini, G. A.—Italia. *Bologna*, 1620.

Mercator, Gerhard.—Atlas minor. *Arnhem*, 1621.

Porcacchi, Thomas.—L'Isole piu famose del mondo. *Venice*, 1576.

Rocque, John.—A plan of the City of Bristol. 4 sheets. *London*, 1742.

——————————England and Wales, drawn from the most accurate surveys. *London* (*circ.* 1750).

Wells, Edward.—A new sett of maps, both of antient and present Geography. *Oxford*, 1700.

Italy.—Plans and views of cities in Italy. 1650–1750.

Japan.—Atlas of Japan, with a map for each Daimio. Published at Osaka in the reign of Tien Pao. 2 vols.

Mediterranean.—Lighting Colom of the Midland Sea. *Amsterdam*, 1661.

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

Bavaria. **Topographische Bureau des K. B. Generalstabes.**

Hypsometrische Karte von Bayern. Bearbeitet im topographischen Bureau des K. B. Generalstabes. Scale 1 : 250,000 or 3·9 stat. miles to an inch. Sheet 16. [Munich, 1905.]

England and Wales. **Ordnance Survey.**

Ordnance Survey of England and Wales:—Sheets published by the Director-General of the Ordnance Survey, Southampton, from November 1 to 30, 1905.

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(*E. Stanford, London Agent.*)

Europe—Central. **K. K. Militär Geographisches Institut.**

Neue Uebersichts-Karte von Mittel-Europa. Scale 1: 750,000 or 11·8 stat. miles to 1 inch. Sheet H 7, Orsova. Vienna: K. K. Militär Geographisches Institut.

A new and revised edition of this useful general map is in course of publication. The area has been extended, and it now includes the whole of Europe from the Baltic to Constantinople, and from the Rhone to the Crimea. Relief is shown by brown shading combined with contours at 500 metres intervals. So far only four sheets have been issued out of a total of forty of which the complete map will consist.

Germany. **K. Preussische Landesaufnahme.**

Karte des Deutschen Reiches. Herausgegeben von der Kartographischen Abteilungen der Königlichen Preussische Landesaufnahme. Scale 1: 100,000 or 1·6 stat. mile to an inch. Sheet (brown hills and contours) 432, Siegen. Berlin, 1904. *Price* 1.50 *mark each sheet.*

ASIA.

Asia Minor. **Kiepert.**

Karte von Kleinasien bearbeitet von Dr. Richard Kiepert. Scale 1 : 400,000 or 6·3 stat. miles to an inch. Sheets: A i. (title); C ii. Afiun Karahibar. Berlin: Dietrich Reimer (Ernst Vohsen), [1905]. *Price 6 marks.*

Mukden. **K. Preussische Landesaufnahme.**

Die Schlacht bei Mukden. Scale 1 : 168,000 or 2·6 stat. miles to an inch. 8 sheets and text. Berlin: E. S. Mittler & Son, 1905.

A series of eight maps and plans showing the disposition and arrangement of the Japanese and Russian armies during the different stages of the battle of Mukden, accompanied by letterpress giving an account of the operations. The maps are based on the sheets of the 1 : 300,000 German Government map of China.

AFRICA.

Africa. **Topographical Section, General Staff.**

Map of Africa. Compiled in the Topographical Section, General Staff. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. Sheets: 94 and 95 (combined). Kilimanjaro. *Price 2s. each sheet.*—Scale 1 : 250,000 or 3·9 stat. miles to an inch. Sheets: (Northern Nigeria) 51-P, 52-M. *Price 1s. 6d. each sheet.* London: Topographical Section, General Staff, War Office, 1905. *Presented by the Director of Military Operations.*

Congo State. **Du Fief.**

Carte de l'État Indépendant du Congo dressée d'après les itinéraires originaux des voyageurs par J. Du Fief. Scale 1 : 2,000,000 or 31·6 stat. miles to an inch. 4 sheets. Brussels, 1905.

A new edition of this well-known general map of the Congo Free State has been much wanted for some time. This is only a reprint of the 4th edition of 1900, and in some districts is quite out of date. On the north-east sheet, Lake Albert Edward is shown in the position it occupied before the Anglo-German Boundary Survey.

Portuguese East Africa. **Topographical Section, General Staff.**

Map of Portuguese East Africa. Based on "Carta de Moçambique, 1903," with additions and corrections. Scale 1 : 3,000,000 or 47·3 stat. miles to an inch. London: Topographical Section, General Staff, War Office, 1905. *Price 2s. Presented by the Director of Military Operations.*

Senegal. **Service Géographique de l'Armée, Paris.**

Carte de Sénégal. Scale 1 : 100,000 or 1·6 stat. mile to an inch. Sheets: XIII., Dakar; XIV., Thiès. Paris: Service Géographique de l'Armée.

These two sheets form part of a general map of Senegal now in course of publication by the Service Géographique de l'Armée, and include Cape Verde with Dakar and the immediate neighbourhood. The topographical features are from surveys of French officers made during the early part of 1904. The sheets are clearly drawn and artistically printed in colours. Contours are given in brown at intervals of 10 metres, while every fiftieth metre is shown by a thicker line.

Zululand. **Alten and Saunders.**

Map of Zululand. Compiled from surveys by L. M. Alten, under the supervision of C. R. Saunders, Natal Commissioner for Zululand Lands Delimitation Commission. Scale 1 : 316,800 or 5 stat. miles to an inch. Pietermaritzburg: Surveyor-General's Office. *Presented by the Surveyor-General of Natal.*

Prepared specially to show the boundaries of Reserves delimited by the Zululand Lands Delimitation Commission, 1902–1904. In addition to the map, text is given on the map defining the boundaries of the Reserves shown. There are two editions of the map, one coloured and the other printed in black only.

Zululand. **Alten, Hammer, and Middleton.**

Map of Zululand. Compiled from surveys by L. M. Alten, A. Hammer, and F. A. Middleton. Scale 1 : 158,400 or 2·5 stat. miles to an inch. 6 sheets. Pietermaritzburg: Surveyor-General's Office. *Presented by the Surveyor-General of Natal.*

By far the best map of Zululand ever produced. It is, however, a provisional map only, and will doubtless be superseded by a more complete survey later on. Hills are

shown in brown horizontal form lines; the rest of the map is printed in black. Mission stations, kraals, magistrate's offices, European houses, trigonometrical points, forts, telegraphs, and railways are all clearly shown, and a considerable amount of general information given. Heights, in those few instances where they have been determined, are given in figures. The map varies considerably as to the character of the work, and in many parts it is evidently drawn from very approximate sketches.

AMERICA.

Argentina. **Ministerio de Agricultura, Buenos Aires.**

Ministerio de Agricultura. Division de Tierras y Colonias. Tierras destinadas para Colonizacion Agricola. Scale 1 : 400,000 or 6·3 stat. miles to an inch. Territorio de Santa Cruz, Zona sud del Rio Santa Cruz; ditto, Zona del Rio Deseado; ditto, Zona de San Julian. Territorio del Neuquen, Zona Andina. Territorio del Chubut, Zona del Rio Senguerr. Scale 1 : 1,200,000 or 3·2 stat. miles to an inch. Buenos Aires: Ministerio de Agricultura, 1904. *Presented by W. S. Barclay, Esq.*

The maps mentioned above have been prepared to accompany a report by the Minister of Agriculture of Argentina, and show the lands at present available in the southern part of the country for colonisation. They are on a large scale, and in some instances are diagrammatic in character. However, the geographical information contained is in many cases more complete than that to be found on any other maps in the Society's collection.

Argentina. **Oficina Meteorologica Argentina.**

Estaciones meteorologicas el 30 de Abril de 1904. Scale 1 : 1,850,000 or 92·3 stat. miles to an inch. Buenos Aires: Oficina Meteorologica Argentina. *Presented by W. S. Barclay, Esq.*

Buenos Aires. **Ludwig.**

Nuevo Plano del Municipio de Buenos Aires y parte del Partido de Avellaneda segun los datos mas recientes. Scale 1 : 35,000 or 1·8 inch to a stat. mile. Buenos Aires: Pablo Ludwig, 1905.

Canada. **Surveyor-General of Canada.**

Sectional Map of Canada. Scale 1 : 190,080 or 3 stat. miles to an inch. Red Deer Sheet (215), west of Fourth Meridian, revised to September 30, 1905. Ottawa: Department of the Interior, Topographical Surveys Branch, 1905. *Presented by the Canadian Department of the Interior.*

South America. **Philip.**

Philip's Comparative Series of Large Schoolroom Maps. South America. Scale 1 : 6,000,000 or 94·7 stat. miles to an inch. London: George Philip & Son, [1905]. *Price* 16*s. Presented by the Publisher.*

AUSTRALASIA.

New Zealand. **Department of Lands and Survey.**

Map of North Island, showing Land Transactions, 1904–05. Ditto, showing the State of the Public Surveys, 1905. Map of Middle Island, showing Land Transactions, 1904–05. Ditto, showing the state of the Public Surveys, 1905. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. Wellington: Department of Lands and Survey, 1905.

These are two interesting maps taken from an official report. The first shows, by four symbols and colouring, the present state of surveys; and the second, lands taken up during the years 1904–05, lands available for settlement, and under Land for Settlement Act. Each map is in two sections.

PACIFIC OCEAN.

Marshall Islands. **Jeschke.**

Karte der Verheerungen des Orkans vom 30. Juni 1905 in den Marshall-Inseln. Von Kapitän Jeschke in Jaluit. Scale 1 : 2,000,000 or 31·6 stat. miles to an inch. *Petermanns Geographische Mitteilungen*, Jahrgang 1905, Tafel 20. Gotha: Justus Perthes, 1905. *Presented by the Publisher.*

POLAR REGIONS.

South Polar Regions. **Schott.**

Meerestiefen im Südpolargebiet nach dem Stand der Kenntnisse bis 1905 von Dr. G. Schott. Scale 1 : 25,000,000 or 394·5 stat. miles to an inch. *Petermanns Geographische Mitteilungen*, Jahrgang 1905, Tafel 19. Gotha: Justus Perthes, 1905. *Presented by the Publishers.*

A general circular chart of the South Polar Region on Lambert's equal area azimuthal projection, extending from the pole to latitude 30° S., and measuring 20¼ inches in diameter. It is bathymetrically coloured, and shows ocean depths in ten different tints. A light buff indicates depths from 0 to 200 metres, and then follow nine shades of blue, indicating depths at intervals of 1000 metres, with the exception of the lightest tint, which is for 200 to 1000 metres. In the compilation of the chart Dr. Schott has generalized the results of all expeditions up to date, although in some respects it might perhaps have been made more complete, specially as regards the configuration of the land areas. It certainly would have been an advantage if the mountain ranges and peaks, with their heights, had been given. It might have been well, also, to have distinguished the land of which the existence is doubtful by a dotted line; as it is, the whole of Wilkes' supposed lands, some of which are extremely problemmatic, are shown as definitely as the discoveries which have been authenticated. However, as regards the south polar ocean, it is a most valuable chart, and, in addition to the bathymetrical tinting, numerous soundings are given, whilst the temperature of the water at many of the soundings is shown in red figures. The chart is accompanied by text giving a most useful summary by Dr. Schott.

GENERAL.

British Empire. **Robertson and Bartholomew.**

Historical and Modern Atlas of the British Empire, specially prepared for students. By C. Grant Robertson, M.A., and J. G. Bartholomew, F.R.S.E., F.R.G.S. London: Methuen & Co., [1905]. *Price 4s. 6d. net. Presented by the Publisher.*

In this atlas the editors have brought together a series of sixty-four historical, geographical, and physical maps and diagrams which will enable the student to follow the gradual development and expansion of the British Empire to the present time. The modern physical and economic maps will, it is hoped, provide the necessary illustration for geographical text-books; the historical maps in particular are intended to illustrate the whole course of British history from the point of view of imperial development, and the two together to prepare for an examination of the deeper and more complicated problems in government, in politics, and economics. The atlas was originally planned in concert with Mr. Hereford B. George, whose 'Historical Geography of the British Empire' will be found a most useful text-book for explaining the growth and structure of the empire, which the atlas is intended to illustrate. Some of the maps are quite new, whilst others are familiar as having appeared in previous atlases by Messrs. Bartholomew. There are two diagrams which are specially instructive—that showing the trade of the United Kingdom, and one at the end of the atlas showing the chronology and expansion of the British Empire.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, during September and October, 1905. *Presented by the Hydrographer, Admiralty.*

No.	Inches.	
3510 m	= 6·9	Scotland, west coast:—Inverie bay and approach. 2*s.* 6*d.*
3509 m	= 1·0	Germany:—Mouths of the Ems. 2*s.* 6*d.*
3446 m	= 0·7	Mediterranean, Ægean sea:—Paspargo islet to Samos strait. 2*s.* 6*d.*
3512 m	= 7·3	West Indies. Cuba, north coast:—Bahia Honda. 2*s.* 6*d.*
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3539 m	= 6·0	Central America, west coast:—Brito road. 1*s.* 6*d.*
3520 m	= 6·0	British Columbia. Vancouver island:—Active pass. 1*s.* 6*d.*
3530 m	= 6·9	Gulf of Aden:—Berbera. 1*s.* 6*d.*
3508 m	= 1·7	Bay of Bengal:—Mayu river. 2*s.* 6*d.*
3518 m	= 1·0	Bay of Bengal:—Bentinck sound. 1*s.* 6*d.*
3525 m	= 9·0	Borneo island, west coast:—Jesselton harbour. 1*s.* 6*d.*
1220 m	= 5·0	China sea. Borneo island:—Mitford harbour. 1*s.* 6*d.*

No.	Inches.	
3515 m	= 2·43	Philippine islands. Luzon island:—Santa Cruz harbour. 1*s.* 6*d.*
3474 m	= 2·0	China, east coast:—Mirs bay. 2*s.* 6*d.*
372 m	= 0·77	Japan:—Kagosima Kaiwan. Plans:—Sakura sima seto. Hamanoichi road. Makurazaki wan. Odomari wan. 2*s.* 6*d.*
3514 m	= 2·0	Japan. Kiusiu, north coast:—Karatsu wan. 1*s.* 6*d.*
3507 m	= 4·0	Japan:—Mororan ko. 1*s.* 6*d.*
2672 m	= 3·6	Japan:—Hakodate ko. 1*s.* 6*d.*
3154 m	= 1·12	Japan. Ominase to Gogo shima. 3*s.* 6*d.*
3531 m	= 6·9	Tasmania, west coast:—Entrance to Macquarie harbour. 1*s.* 6*d.*
3519 m	= 2·8 / 4·7	New Britain, etc. Duke of York group. Miako harbour. 2*s.* 6*d.*
3500 m	= 0·7	New Zealand. North island, east coast:—Cape Runaway to Gable end Foreland. 2*s.* 6*d.*
179 m	= 0·23 / 1·73	New Hebrides:—Espiritu Santo island. Turtle and Pallikulo bays and approaches. 1*s.* 6*d.*
1923*a*		British Columbia. Cape Caution to port Simpson, etc. Plan added:—Kemano bay.
3145		Bay of Bengal. Andaman islands. Plan added:—Eastern entrance to the Andaman or Middle strait.
55		New Britain, anchorages in. New plan:—Unter Kambeira.
1416		New Guinea. Anchorages on the north-west coast. New plan:—Fak Fak and Acha Tuning roads.
1101		Pacific ocean. Mariana or Ladrone islands. New plan:—Guam or Guajan island.

(*J. D. Potter, Agent.*)

Charts Cancelled.

No.		Cancelled by	No.
1893	Sighajik bay to Gulf of Skala Nuova	New Chart.	
1527	Gulf of Skala Nuova.	Paspargo islet to Samos strait	3446
411	Bahia Honda. Plan on this sheet.	New plan. Bahia Honda	3512
1286	River Lebu. Plan on this chart.	New plan. Port Lebu	3528
919	Berbera. Plan on this sheet.	New plan. Berbera	3530
835	Bentinck sound. Plan on this sheet.	New plan. Bentinck sound	3518
838	Andaman strait	New plan. Eastern entrance to the Andaman strait .	3145
2111	Gaya harbour. Plan on this chart.	New plan. Jesselton harbour	3525
1220	Mitford harbour.	New plan. Mitford harbour	1220
372	Gulf of Kagosima, upper part.	New chart. Kagosima kaiwan and plans	372
993	Mororan or Endermo harbour. Plan on this sheet.	New plan. Mororan ko	3507
2672	Hakodate harbour.	New plan. Hakodate ko	2672
764	Duke of York group. Port Hunter. Plans on this sheet.	New plans. Duke of York group, Miako harbour . .	3519
55	Weber bay. Plan on this sheet.	New plan. Unter Kambeira	55
179	Approaches to Pallikulo bay.	Espiritu Santo island. Turtle and Pallikulo bays and approaches	179

(*J. D. Potter, Agent.*)

Charts that have received Important Corrections.

No. 1446, Scotland, east coast:—Aberdeen. 1121, Norway:—Bergen. 2369, Germany, north coast. Sheet V.:—Rischöft to Brüster ört. 77, Spain, north and west coast:—

Bay of Gijon. 2231, Black Sea, Sheet II.:—Cape Kaliakra to Odessa. 3335, Labrador:—Approach to strait of Belle isle. 779, Labrador:—Belle isle strait. 282, Newfoundland:—St. John bay to Orange bay. 284, Newfoundland:—Cow head harbour to St. Geneviève bay. 266, East coast of United States:—Great Egg harbour to Albemarle sound. 1296, Chile:—Plans on the coast of. 2839, United States, west coast:—Columbia river. 2111, Borneo island, Sheet VII.:—Nosong point to Ambong bay. 2636, Philippine islands:—Strait of Makassar, north part. 1760, China:—The Brothers to Ockseu islands. 2409, China, east coast:—West coast of Formosa, etc. 532, Japan:—Simonoseki strait. 132, Japan:—Channels between Nisima Nada and Bingo Nada. 2411, New Zealand:—Otago harbour. 1103, Pacific ocean:—Palao or Pelew islands, etc. 980, Pacific ocean:—Caroline islands. 2169, Pacific ocean:—Islands in the North Pacific.

Chile. **Chilian Hydrographic Office.**

Chilian Hydrographic Chart. No. (Provisional) 123, Canales en el seno Última Esperanza. Valparaiso: Oficina Hidrografica, Marine de Chile, 1905. *Presented by the Chilian Hydrographic Office.*

North Atlantic and Mediterranean. **Meteorological Office.**

Pilot Chart of the North Atlantic and Mediterranean for December, 1905. London: Meteorological Office, 1905. *Price* 6*d. Presented by the Meteorological Office.*

North Pacific. **U.S. Hydrographic Office.**

Pilot Chart of the North Pacific Ocean for December, 1905. Washington: U.S. Hydrographic Office, 1905. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Algeria. **Hilton-Simpson.**

Eighty-eight photographs of Algeria, taken by M. Hilton-Simpson, Esq. *Presented by M. Hilton-Simpson, Esq.*

A most interesting set of photographs of Southern Algeria and the Algerian Sahara. The subjects are typical and well chosen. The panoramas, of which there are many, are exceptionally good, and all are carefully described by Mr. Hilton-Simpson, which adds considerably to their value.

(1) A side of the market at Biskra; (2) Royal Hotel, Biskra; (3) An Uled Näil dancing girl; (4) Typical view of the scenery near the railway between El Guerrah and Biskra; (5) View of the Col de Sfa; (6) Arab and Negro children, Sidi Okba; (7) Interior of the "fonduk" or camel yard near the live-stock market, Biskra; (8) The market-place, Sidi Okba; (9) Sidi Okba; (10) Hotel Dar Diaf and Casino, Biskra; (11) Looking southward up the valley of Wed Marsa; (12) Shelter used as a summer residence by Kabyles above Wed Marsa; (13) Cap Carbon, Wed Marsa; (14) A group of Kabyles near Wed Marsa; (15) The Hotel de Roulage, Wed Marsa; (16) Kabyle children, Wed Marsa; (17) The Valley of Wed Marsa; (18) Group of Kabyles at Wed Marsa; (19) Bey of Bou-Saada; (20) Caravan leaving the market at Sidi Aissa; (21) The Aumale to Bou-Saada coach; (22) The coach from Buira to Aumale; (23) Arrival of the Sub-prefect of Setif at M'Sila; (24) An Arab street, M'Sila; (25) Kaid's horse; (26) An old well at Duar Saidat near M'Sila; (27) The square, M'Sila; (28) Bordj, Chellal; (29) Road-making at Baniu; (30) Sorting snuff tobacco at M'Sila; (31) French well in the desert near M'Sila; (32-34) Duled Naïl dancers of M'Sila; (35) View in the part of the Plateaux des Shotts known as the Petit Sahara; (36) The Wed M'Sila; (37) Square in the European and mercantile town, M'Sila; (38) General view of M'Sila; (39 and 40) The market place, M'Sila; (41) Monument to the victims of the massacre of 1871, Palestro; (42) Road entering a tunnel, Palestro; (43) Cascade in the gorge of Palestro; (44) In the gorge of Palestro; (45) The entrance to the gorge of Palestro; (46, 47, 49, and 50) The Gorge of Palestro, looking northward; (48) The gorge of Palestro, looking southward; (51) The pool, Roumana Gueblia; (52) Tents of the semi-nomadic tribe Hauamed; (53) Native ponies in the yard behind an Arab House at Rumana Gueblia; (54) Pitching a chief's tent opposite to mine at Rumana Gueblia; (55) "Drawing" for a hare in the Petit Sahara, near Rumana Guebla; (56) Fertile bed of a stream at Rumana Gueblia; (57) Belcassem ben Zumi, brother of the Kaid of Rumana; (58) Boy making a shoe of halfa grass, Rumana Gueblia; (59) Tent of the Hauamed tribe; (60) Two "sloughis" or native hounds; (61) Dry bed of a stream near Rumana Gueblia; (62) The servants shaving each other's heads at Rumana Gueblia; (63) My camel-driver going from Rumana to

Bu-Saada; (64) Kadur ben El Haj, eldest son of the Kaid of Rumana; (65) In the Petit Sahara; (66) House lent to me at Rumana Gueblia; (67) The gardens in the oasis of Rumana Gueblia; (68) Dur camp; (69) General view of Rumana Gueblia; (70) A general view of the Petit Sahara; (71 and 72) In the market of the Beni-Menguellet tribe; (73) An extemporized *café* in the market of the Beni-Menguellet; (74 and 75) Market of the Beni-Menguellet tribe of Grande Kabylie; (76) The Jurjura chain from Michelet; (77 and 79) Kabyle village near Michelet; (78) Street in a Kabyle village near Michelet; (80) The native quarter of Jizi-Uzu; (81) The diligence which runs from Fort National to Fizi-Uzu; (82) An old Kabyle near Michelet; (83) A small market near Michelet; (84) Kabyle children near Michelet; (85) View looking towards Michelet; (86) A view of the Jurjura chain in Grande Kabylie; (87) Fizi-Uzu; (88) Hills to the north of Michelet.

Bolivia and Peru. **Petrocokino.**

Fifty-nine photographs of Bolivia and Peru, taken by A. Petrocokino, Esq. *Presented by A. Petrocokino, Esq.*

These photographs form a welcome addition to the Society's collection. The views of Cuzco and neighbourhood are specially interesting.

Bolivia.—(1-3) Market-place, Oruro; (4) A square in Oruro; (5) Old church, Oruro; (6) Post near Oruro; (7) Village of Challas; (8) View from Challas; (9) Village of Parotani near Cochabamba; (10) Llamas on the Bolivian pampas; (11) Village of Quilloguolla; (12) Market-place, Quilloguolla; (13) Avenue leading into Cochabamba; (14) Adobe telegraph post; (15) The plaza, Cochabamba; (16) Cathedral, Cochabamba; (17) Adobe church near Argue; (18) Old Inca houses near Caracoles; (19) View of La Paz; (20) Inside view of La Paz; (21) Lake Titicaca from Chilelaya; (22) Lake Titicaca; (23) Balsa on Lake Titicaca; (24) End of Lake Titicaca; (25) Indians near borax lake of Carcoti.

Peru.—(1) Balsa on Lake Titicaca; (2) View of Puno, with Lake Titicaca in the distance; (3) Cathedral and market-place, Puno; (4) Indian funeral in village near Urcos; (5) Cathedral, Cuzco; (6) Jesuit church and the University, Cuzco; (7) Fountain near cathedral, Cuzco; (8) Sacsahuaman, the citadel, Cuzco; (9 and 11) Old Inca walls at Cuzco; (10) The "Inca's seat," with ruined Inca walls, Cuzco; (12) Cuzco from Sacsahuaman; (13) Market-place from the cathedral, Cuzco; (14) View of Cuzco from the top of Sacsahuaman; (15) Old Spanish house with Inca foundations, Cuzco; (16) Llamas in Cuzco; (17) Plain of Ayacucho; (18) Between Abancay and Andahuaylas; (19) Bridge over gorge of Rio de Pampas; (20) At Urubamba; (21) Between Huancarama and Andahuaylas; (22) Fortress of Ollantaytambo; (23 and 25) Citadel of Ollantaytambo; (24) Ollantaytambo; (26) Stones on top of citadel of Ollantaytambo; (27) View from citadel of Ollantaytambo, with two ruined Inca "palaces" on side of mountain; (28) Upper terrace on citadel of Ollantaytambo; (29) Large monolith on citadel of Ollantaytambo; (30) Suspension bridge near Acobamba; (31) Suspension bridge at Pissac; (32) View near Chincheros; (33) Village of Curuhuasi; (34) Bridge over river Angayacu.

Congo State.

Ten photographs of the Upper Congo Railway. *Presented by Campagnie des Chemins de Fer du Congo Supérieur aux grands Lacs Africains.*

A set of mounted platinotype enlargements.

(1) Building workshop; (2) Timber bridge, kilom. 10; (3) Unloading a steamer at Stanleyville; (4) Wharf and steamer at Stanleyville; (5) Bridge, kilom. 10; (6) The line near Stanleyville; (7) Stanleyville station; (8) Digging a trench near Stanleyville; (9) Bridge, kilom. 20; (10) A crossing near Stanleyville.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

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to illustrate the

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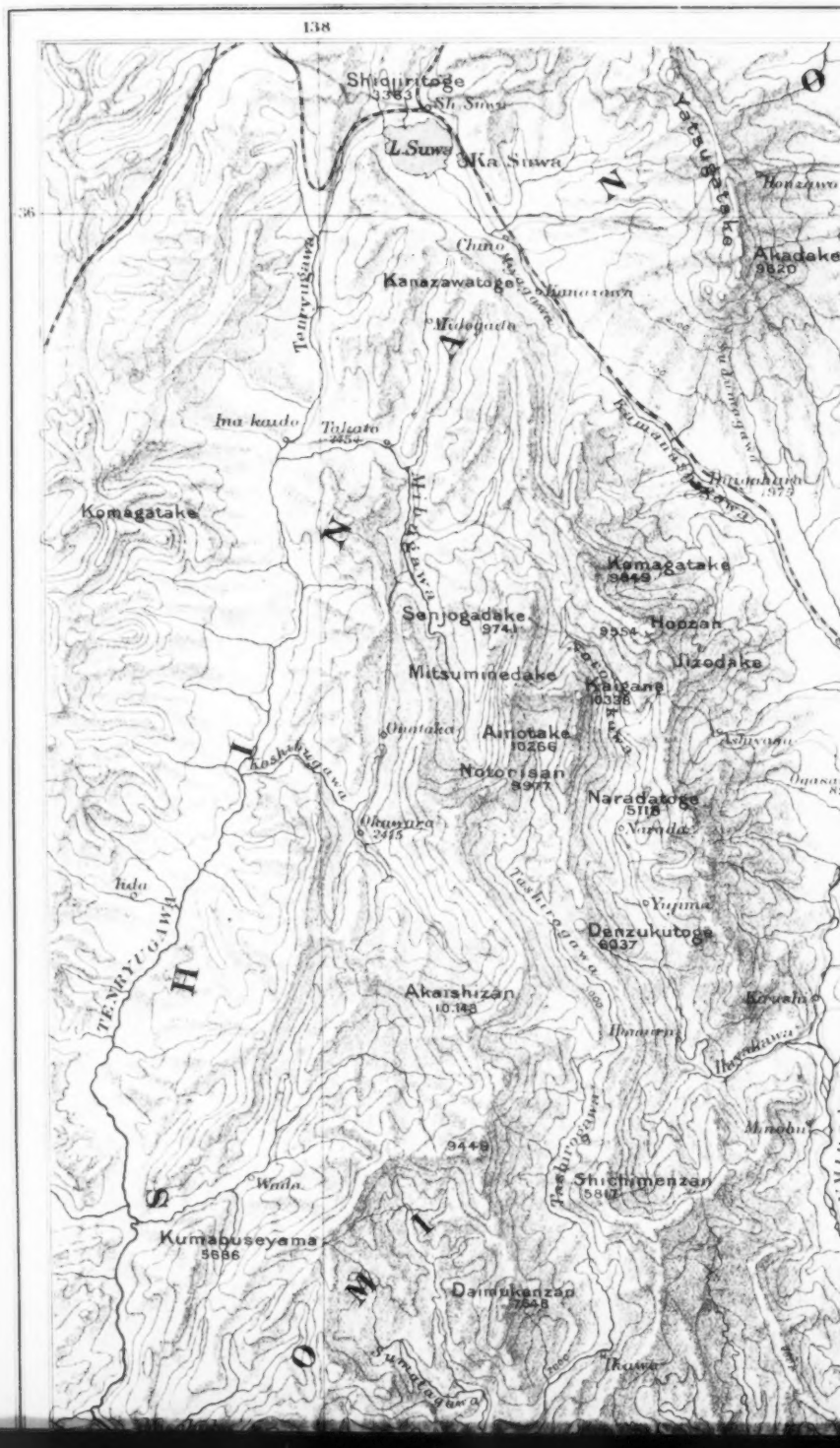
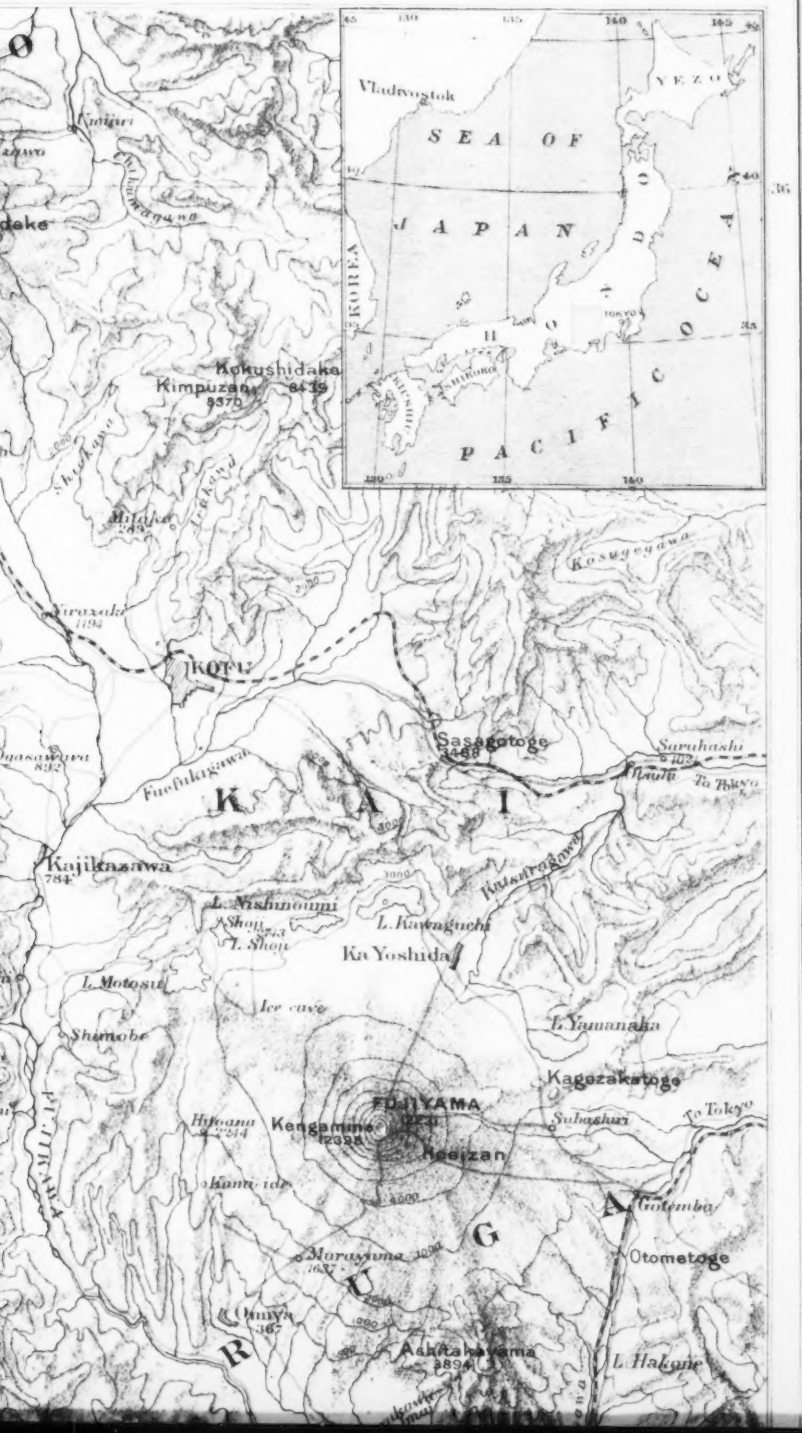
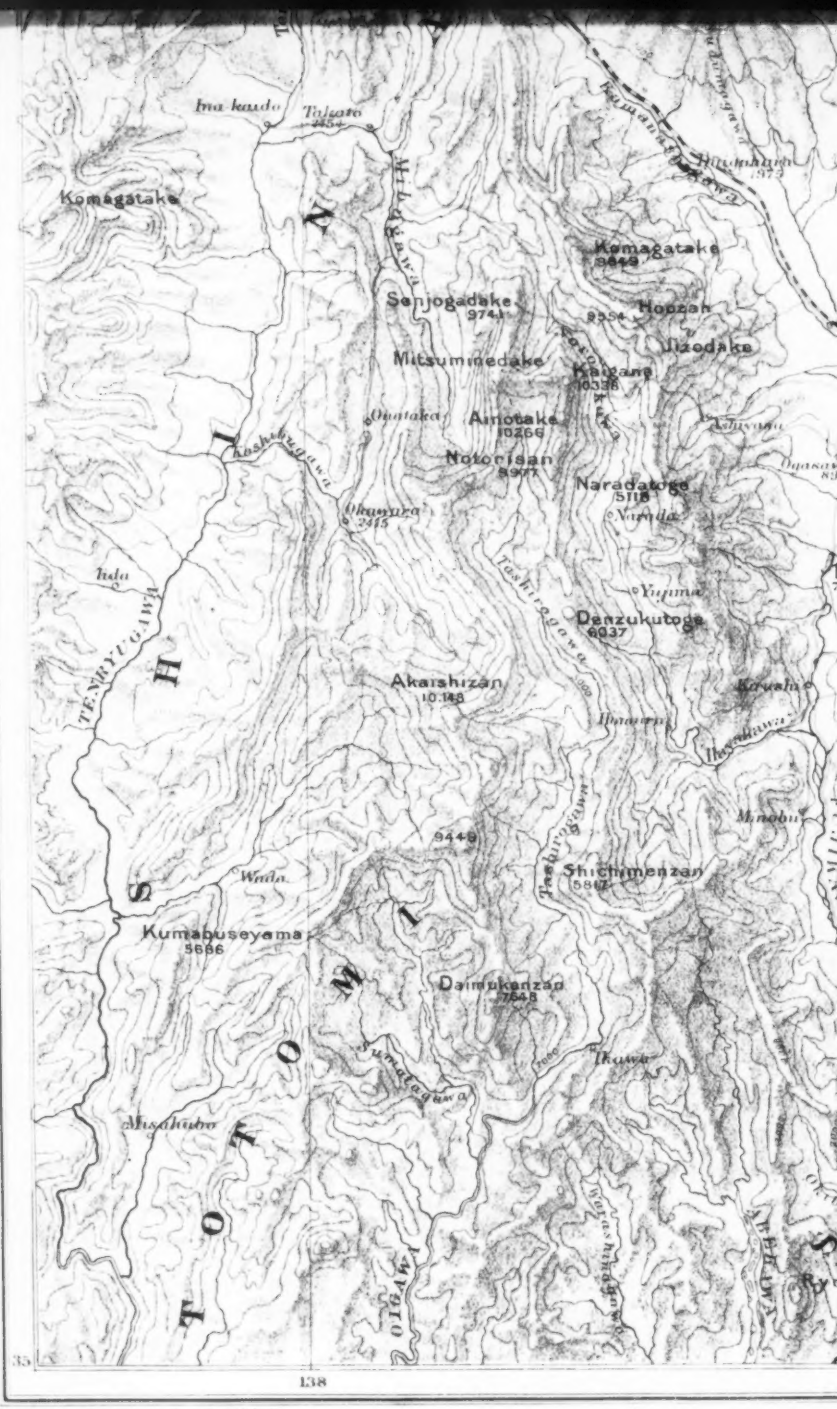


JAPANESE ALPS.

he paper by

WESTON, M.A.





Contours at intervals of 1000 feet

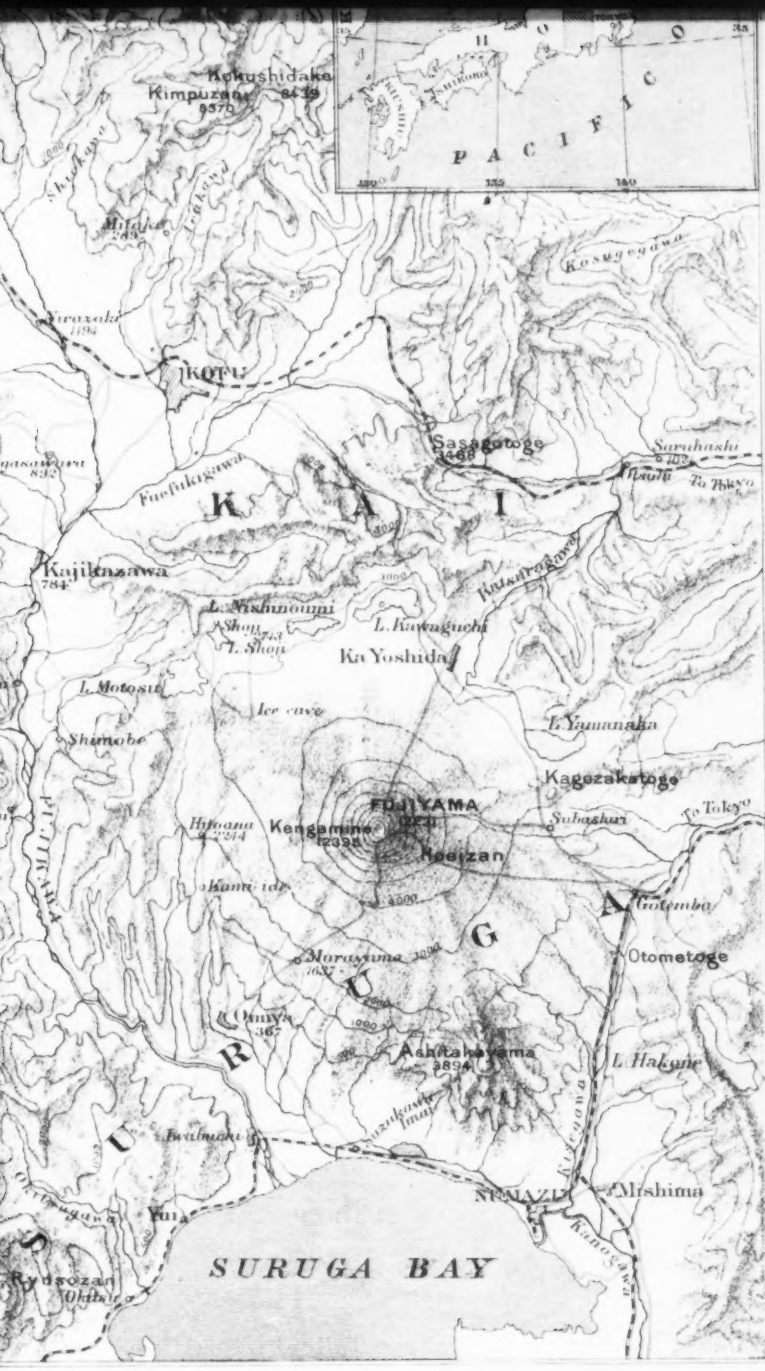
Scale of Mi

Nat. Scale 1 : 500,000 or 7

Route. Rail

Heights in Fe

Published by the Royal Geog



Miles

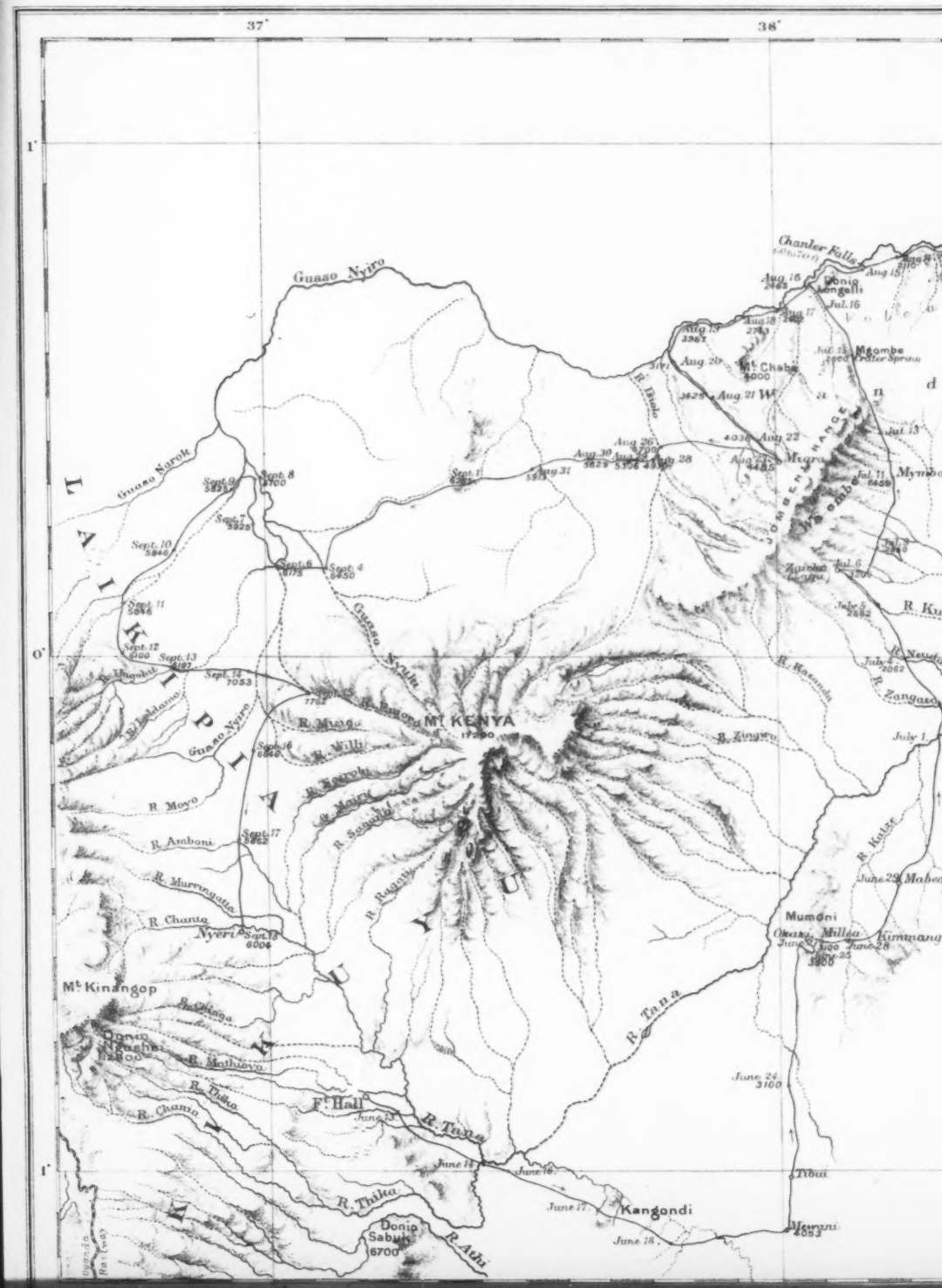
0 5 15 20

or 7·89 miles = 1 inch

Railways

n Feet

graphical Society.


37°
38°
1°
0°
1°
Guaso Nyiro
Guaso Narok
Guaso Nyuki
Guaso Nyiro
Chanler Falls
Donio Longelli
Mt Chaba 6000
Mt KENYA 17200
Mt Kinangop
Donio Nasheti 12800
Donio Sabuk 6700
Kangondi
Mumoni
Tibui
Mwyani
Mbombe
Myuro
Mymbo
Zuchia
R. Kamindi
R. Zangasa
R. Kaitze
R. Tana
R. Thika
R. Chania
R. Mathioya
R. Amboni
R. Moyo
R. Murrungatia
R. Chania Nyeri
R. Rupingazi
R. Sagana
R. Nairobi
R. Mutitu
R. Mugo
R. Ragati
R. Athi
R. Ewaso
R. Zungaru
R. Kamindi
R. Kitui
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F. Hall
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Sept 14 7053
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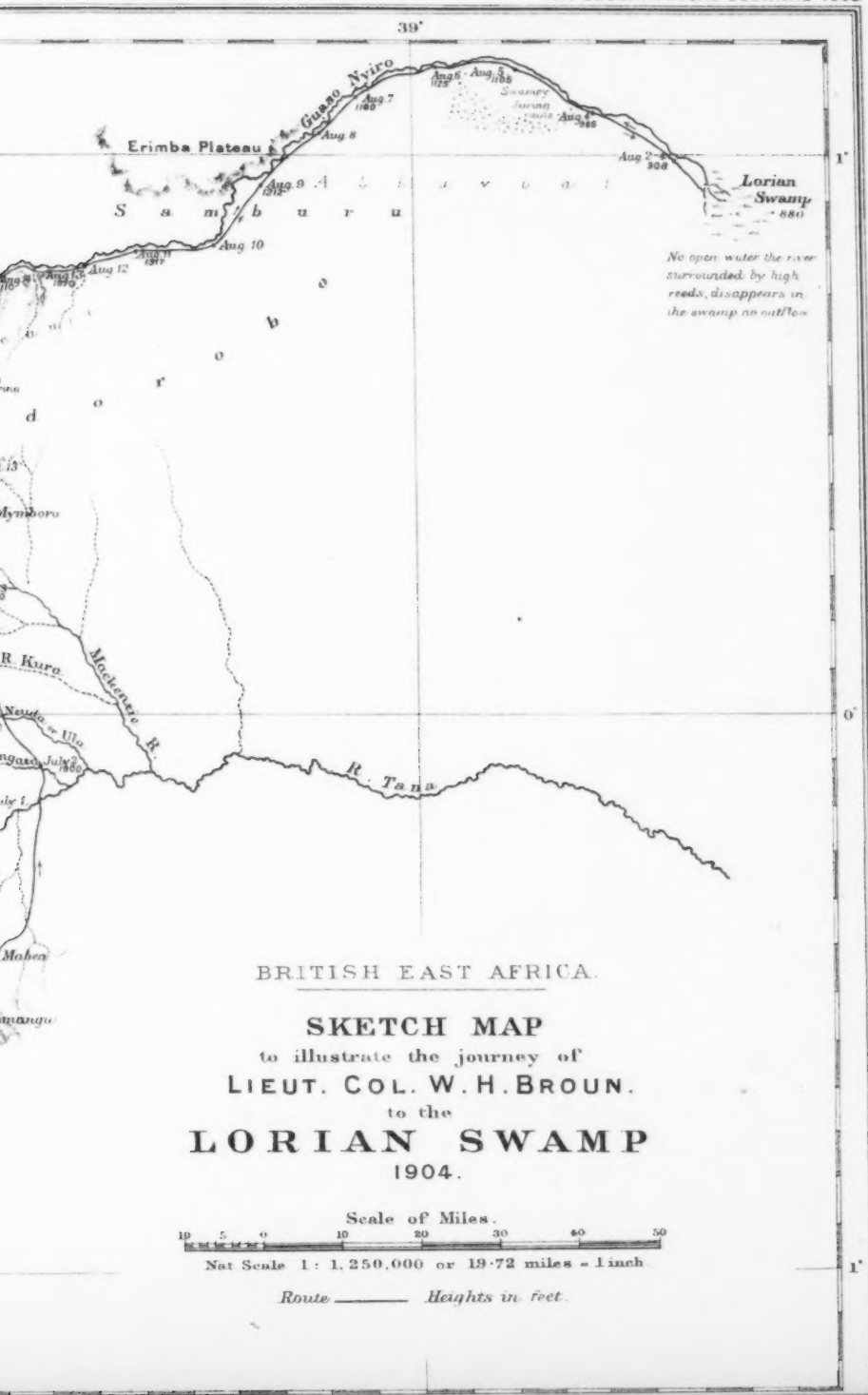


BRITISH EAST AFRICA.

SKETCH MAP

to illustrate the journey of

LIEUT. COL. W. H. BROUN.

to the

LORIAN SWAMP

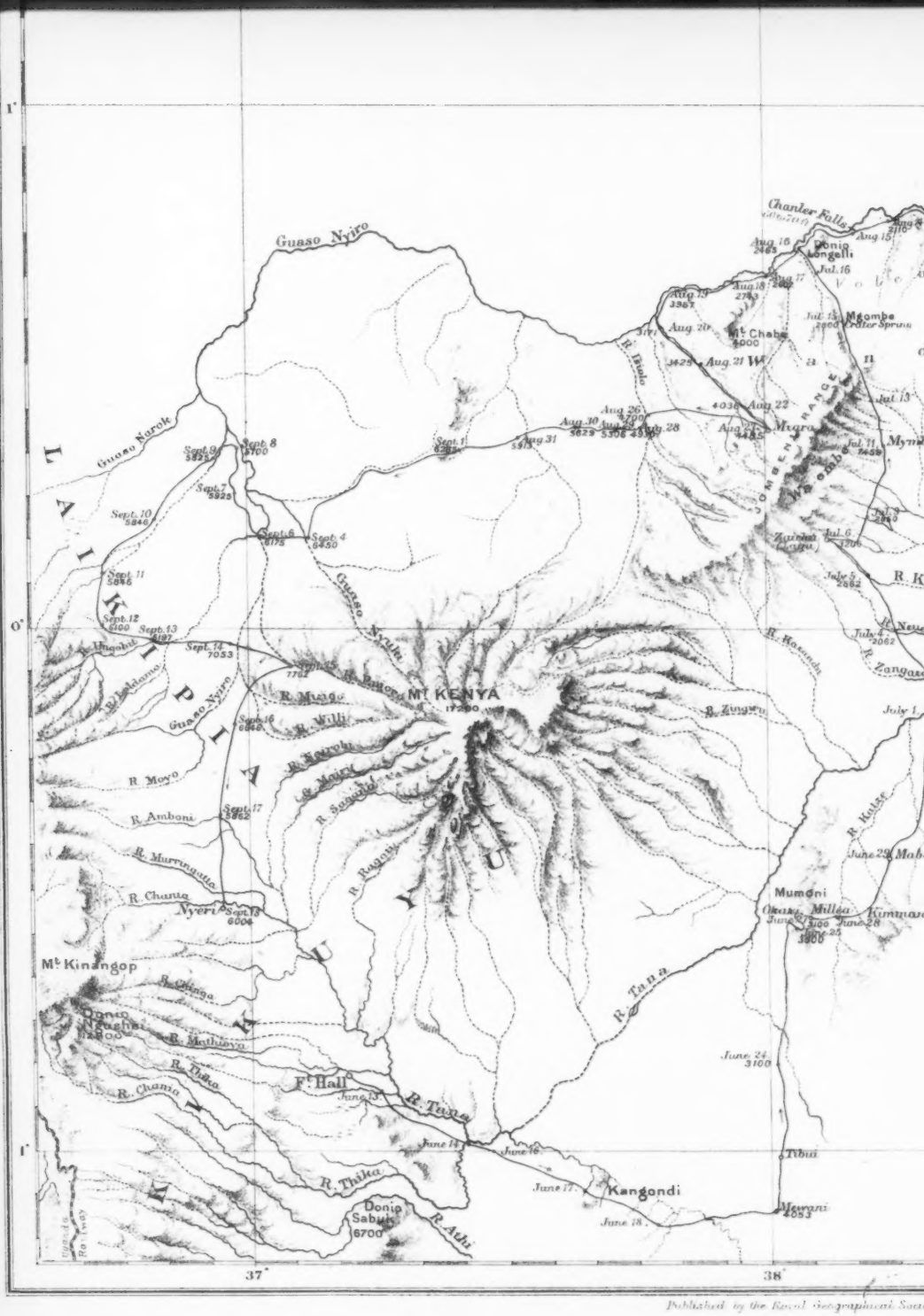
1904.

Scale of Miles.

10 5 0 10 20 30 40 50

Nat Scale 1 : 1,250,000 or 19·72 miles = 1 inch

Route ——— *Heights in feet.*


Guaso Nyiro
Guaso Narok
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Sept. 8 6700
Sept. 7 5925
Sept. 10 5846
Sept. 6 6175
Sept. 4 6450
Sept. 11 5846
Sept. 12 6100
Sept. 13 6197
Sept. 14 7053
Guaso Nyiro
R. Ewaso Nyiro
R. Muoga
R. Willi
R. Moyo
R. Amboni
Sept. 17 5862
R. Murringutta
R. Chania
Nyeri Sept. 18 6004
Mt. Kinangop
R. Chania
Donio Kashai 12800
R. Muthanya
R. Thika
R. Chania
F. Hall
June 13
R. Tana
June 14
June 16
R. Thika
June 17
Kangondi
June 18
Donio Sabuk 6700
R. Athi
Mt. KENYA
17200
R. Nanyuki
R. Sagana
R. Rupingazi
Guaso Nyiro
R. Ewaso Nyiro
R. Hasamba
R. Zangwa
July 1
July 4 2062
July 5 2062
Zuriani
Jul. 6 1700
Jul. 11 5429
Jul. 13
Jul. 15
Mt. Chaba 5000
Aug. 15 2465
Donio Longelli
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Aug. 18 2462
Aug. 19 3367
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Aug. 21
Aug. 22
Aug. 26 3700
Aug. 10 3629
Aug. 28 4330
Aug. 31 5917
Sept. 1 6200
R. Biolo
Mbombe
Crater Springs
Mugra
Mumoni
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June 28
June 25 3060
June 24 3100
R. Tana
Tibui
Mwani 4053
R. Kulse
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Mab
R. Zangwa
R. Hasamba
R. K
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Aug. 15
Chanler Falls
Donio Longelli
Mbombe
Crater Springs
Mt. Chaba
Mugra
Mumoni
Tibui
Kangondi
Mwani
Donio Sabuk
Donio Kashai
Mt. Kinangop
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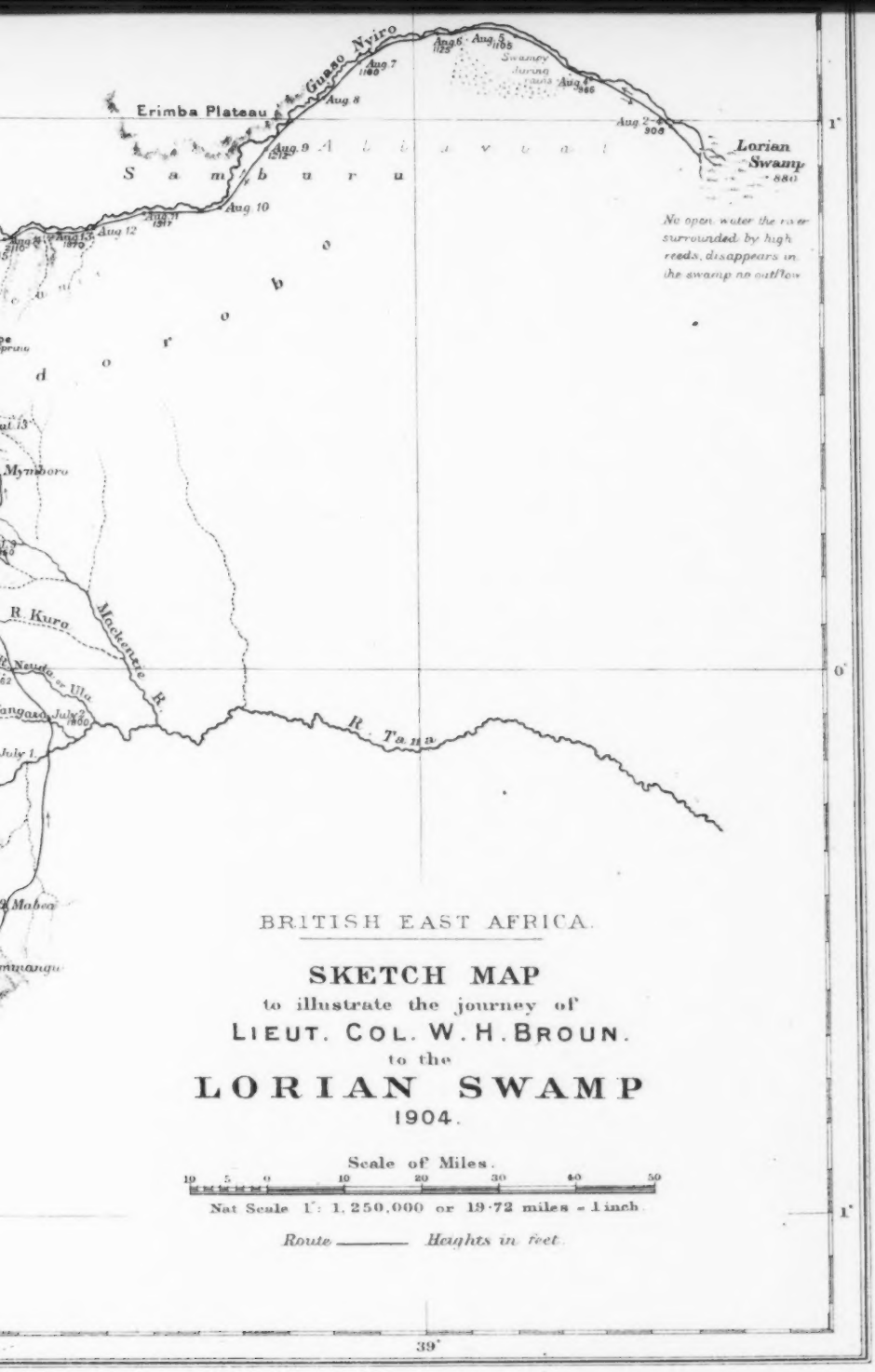
Guaso Nyiro
Erimba Plateau
Aug 6
Aug 5
1105
1125
Swampy
during
route
Aug 4
966
Aug 7
1180
Aug 8
Aug 2
906
Lorian
Swamp
880
Aug 9
1512
S a m b u r u
Aug 10
Aug 11
1317
Aug 12
No open water the river
surrounded by high
reeds, disappears in
the swamp no outflow
1°
Mymboro
R. Kuro
Mackenzie R.
Ngutu or Ula
July 2
1800
R. Tana
July 1
R. Mabea
0°
BRITISH EAST AFRICA.
SKETCH MAP
to illustrate the journey of
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1°
39°